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Pacific Southwest Region

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Draft Environmental Impact Statement

Pine Mountain Late-Successional Reserve Habitat Protection and Enhancement Project

Lake and Mendocino Counties, California

Photo: view from Pine Mountain Lookout. Recreation.gov

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Abstract

<u>Current conditions</u>

The Pine Mountain Late Successional Reserve (LSR) is one of the smaller LSRs within the Forest but provides an important link between the Blue Slides LSR seven miles to the southeast and the Sanhedrin LSR, 1.25 miles to the north. The Pine Mountain LSR also provides a critical link to State and other Federal lands to the south and west. It is the last remaining largest southernmost functional patch of late successional habitat in the Inner California Coast Range of California. The area is currently part of Northern Spotted Owl Critical Habitat (Unit 11, Subunit ICC 5), a land allocation designated by US Fish and Wildlife Service, and also includes 1.6 miles of critical habitat for anadromous fish. These habitats are located within both the LSR and matrix lands. However, the LSR is suffering from overstocking and crowding of trees across a range of diameters. In the majority of the LSR small diameter trees (< 10 inches diameter breast height) are the main problem. Due to past management activities the forest is so dense that walking through it is almost impossible and the quality of habitat is declining. In other areas trees across a range of diameters are very dense and present ladder fuels problems that threaten the overstory canopy. A wildfire in the project area would likely result in large contiguous areas of habitat loss rather than small patches that would have occurred in historic times.

We observe an alteration of species composition shifting toward a majority of shade tolerant species, such as Douglas-Fir, a decrease in biodiversity, declining forest health and resiliency to inherent disturbances, such as fire, insects, and disease. Density related tree mortality is occurring over large areas and the susceptibility to drought-induced tree mortality, because of intense between tree competition for resources (light, nutrients and water) is increasing.
Ecological consequences of past land management practices also include:

- diminished late successional habitat for wildlife including the northern spotted owl;
- increased forest stand density with low-level growth and/or vigor;
- increased susceptibility of forest stands to insects and disease;
- changed species composition of forestlands, grasslands, chaparral, and oak woodlands;
- habitat alteration of forestlands, chaparral, oak woodlands, and grasslands (i.e. loss of biodiversity); and
- Increasing probability of larger more intense fires (Perry et al. 2011).

<u>Future Desirable Conditions</u>

Future desirable conditions as described in the Mendocino National Forest Land and Resource Management Plan (LRMP 1995) include an increase of northern spotted owl (NSO) habitat as well as increased habitat for species that depend on late seral forests. Additionally, future desired conditions include a decrease in the size and intensity of wildfires, and a decrease in the potential for stand replacing losses from major outbreaks of insects such as pine beetles and diseases.

The Pine Mountain Late Successional Reserve Assessment (USDA 2000) identifies the project area as having a history of frequent, low-intensity fires which is desirable to maintain healthy ecological conditions. Most of the recent larger fires within the project area, have included a high proportion of acres burned at higher intensity than desired (USDA 2000). This is most likely due to a departure from the natural fire return interval. The LSRA rates fuels hazard, within the project area, as

moderate, however the current project analysis for the project area rated this area as having a high fuels hazard (Fire and Fuels Report, USDA 2016c). Future desirable conditions are a reduced fire hazard rating.

Purpose and need

The primary purpose of the proposed Pine Mountain Late Successional Reserve Habitat Enhancement and Protection project is to protect and enhance late successional habitat by putting the landscape on a trajectory where characteristic fire regimes and processes can return and ecological processes are restored. Silvicultural treatments (including prescribed fire) are being proposed to reduce stand density and increase the quality and amount of late successional habitat by increasing species diversity and average tree size. By reducing stand density, between-tree competition for resources will be reduced and the remaining trees will be more resilient to fire, insects, and disease. The remaining trees will also be more resilient to drought and warmer drier periods which are anticipated due to climate change (IPCC 2014). Treatments are also being proposed to reduce ladder fuels to lessen overstory mortality in the event of a wildfire and to better protect the LSR from fires entering from the west and southwest.

As stated in the Northern Spotted Owl Recovery Plan (2011) federal land managers need to be maintaining or improving ecosystem resilience in the face of climate change. Resilient forests are those that not only accommodate a gradual change related to changes in climate but also tend to return toward a prior condition after disturbance either naturally or with management assistance (Millar et al. 2007). Managing for resilient forest conditions should be considered a fundamental recovery goal for norther spotted owls. Federal land managers should apply ecological forestry principles where long-term northern spotted owl recovery will benefit, even if short-term impacts to spotted owls may occur (Franklin et al. 2007, USDI FWS 2007). There is a need to implement actions consistent with the LRMP, LSR assessment, and Spotted Owl Recovery Plan guidelines to reduce the probability of large scale loss of Late Successional Habitat and protect this vital link between other areas of Late Successional Habitat.

The LSRA also identifies areas with high road densities that fragment wildlife habitat. Roads can also affect the natural hydrologic flow path, and, if not designed and maintained properly, can lead to significant erosion and mass wasting problems. There is an opportunity within this project to decommission or close roads that are no longer needed, and storm proof ones that will receive future use. There is a need to develop and manage a transportation system that minimizes the impacts of roads on the landscape.

Treatments are being designed to accomplish the following Purpose and Need objectives:

1. Enhance habitat for the northern spotted owl and associated late successional species.
2. Reduce the risk to late-successional habitat loss from wildfire through vegetative treatments designed to modify and restore characteristic fire regimes and forest structure.
3. Improve forest health, vigor, and resilience to fire, insects and disease as well as enhance the diversity of plant and animal habitat found within the project area
4. Manage National Forest lands (including roads and trails) to meet the Aquatic Conservation Strategy Objectives and direction set forth in the Mendocino National Forest Land and Resource Management Plan (LRMP).

Based on the guiding principles from the LSR assessment, this project is designed to achieve the objectives and facilitate ecosystem restoration for a more sustainable future condition.

To Provide Comments: The Pine Mountain LSR Habitat Protection and Enhancement Project Draft Environmental Impact Statement (DEIS) is available online at the Mendocino National Forest website: http://fs.usda.gov/mendocino. Reviewers should provide the Forest Service with their comments during the review period of the DEIS. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. (36 CFR 218.5) Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3). The opportunity to Comment ends 45 days following publication of the notice of availability (NOA) in the Federal Register.

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The acceptable format(s) for electronic comments are PDF, MS Word or Rich Text Format.

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Document Structure

The Forest Service has prepared this Draft Environmental Impact Statement (DEIS) in compliance with the National Environmental Policy Act (NEPA 1970) and other relevant Federal and State laws and regulations. TheDEIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

- **Chapter 1. Purpose and Need for Action:** This chapter describes the management direction under which the DEIS was prepared, the purpose and need for action, and the objectives that will be used to compare the alternatives analyzed.
- **Chapter 2. Alternatives, including the Proposed Action:** This chapter provides a detailed description of the agency's proposed action as well as alternative actions that were developed in response to comments raised by the public during scoping. The end of the chapter includes a summary table comparing the proposed action and alternatives with respect to their environmental impacts.
- **Chapter 3. Affected Environment and Environmental Consequences:** This chapter describes the environmental impacts of the proposed action and alternatives.
- **Chapter 4. Consultation and Coordination:** This chapter provides a list of preparers and agencies consulted during the development of the DEIS.
- **Appendices:** The appendices provide more detailed information to support the analyses presented in the DEIS.

Specialist reports for Silviculture (vegetation), Wildlife, Fire and Fuels, Air Quality, Hydrology, Botany, Noxious Weeds, Recreation, Economic Analysis, Survey and Manage, Fisheries and aquatics, and Geology, contain detailed analyses of the alternatives and may be found in the project planning record located at the Upper Lake Ranger District, Mendocino National Forest. Incorporating the specialist's reports entire document would make the DEIS extremely lengthy. Therefore only summaries of the specialist's reports are included in the DEIS. All resource specific management direction and mitigations will be followed as stated in the specialist's reports.Specialist reports are hereby incorporated by reference and are available upon request and on website: https://www.fs.usda.gov/project/?project=13615.

Chapter 1. Purpose of and Need for Action

Introduction

The Mendocino National Forest proposes to implement a landscape scale ecological restoration project in the Pine Mountain Late Successional Reserve (LSR) area. The primary purpose of this project is to protect and enhance wildlife habitat, while improving ecosystem health and resilience specifically within late successional habitat, which is critical for the northern spotted owl (Strix occidentalis caurina NSO). The project area is approximately 10,200 acres. 8000 acres are proposed for prescribe burning treatment and of those 8000 acres, 5340 acres would receive vegetation thinning (these acres are approximate). The area is dominated by Douglas fir and Ponderosa pine. The project would take place on the National Forest System lands administered by the Upper Lake Ranger District, Mendocino National Forest in Lake and Mendocino Counties, California.

The Project Area is located approximately 15 miles north of the town of Upper Lake, primarily in T18N, R10W, and portions of T18N, R11W; T17N, R10W; and T17N, R11W, Mount Diablo Base Meridian. (Figure 1).

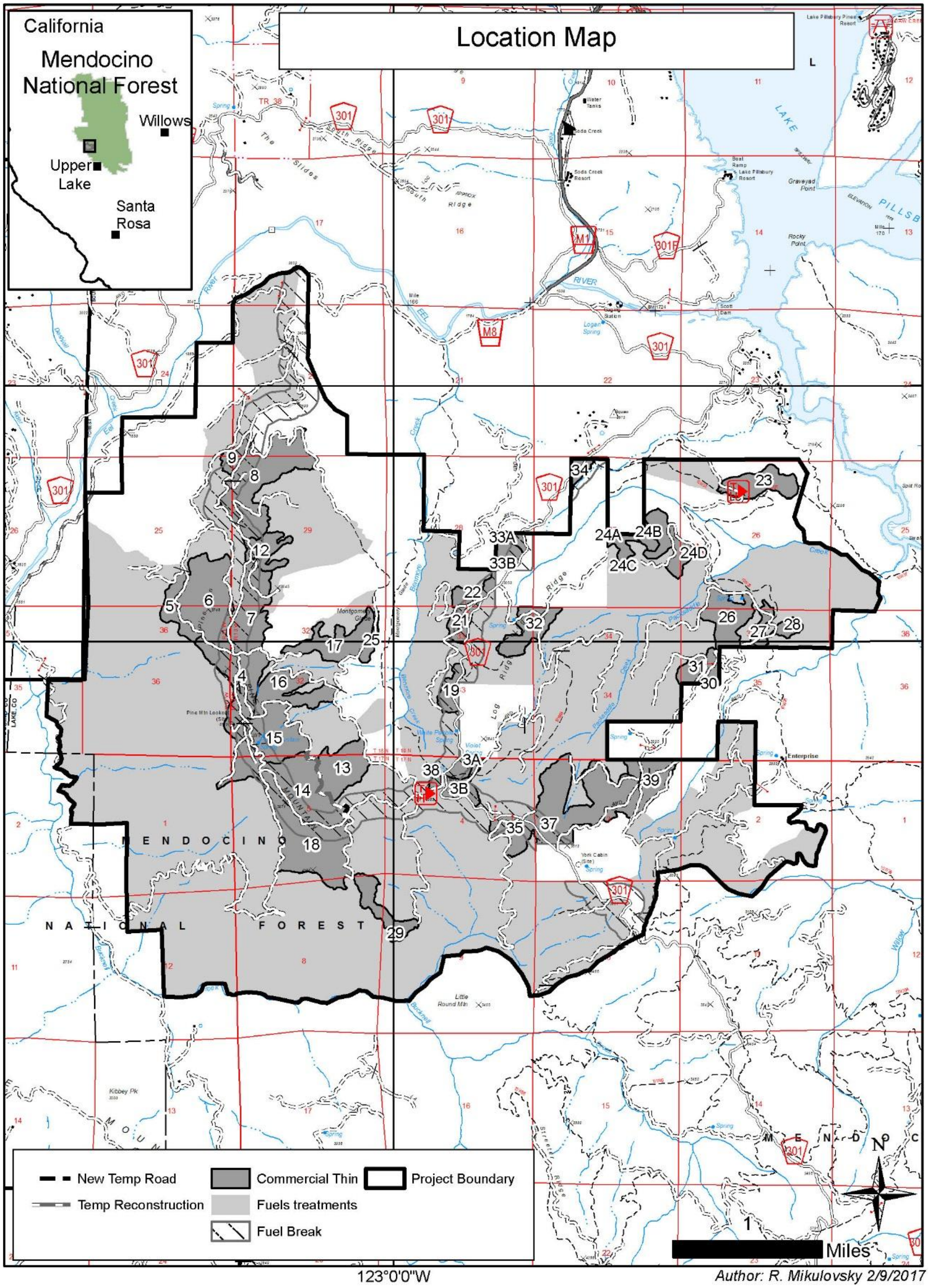

Figure 1. Pine Mountain project overview.

Management Direction

National Forest management is guided by various laws, regulations, and policies that provide the framework for all levels of planning. This includes regional guides, Land and Resource Management Plans, and site-specific planning documents such as this DEIS. These higher-level documents are incorporated by reference and can be obtained from Forest Service offices. Relevant laws, regulations, and policies in addition to LRMP direction are also referenced in individual specialist reports that are part of the project record.

This project would implement direction found within the Mendocino National Forest Land and Resources Management Plan (LRMP), signed and published in 1995. This document was updated to be in conformance with the Northwest Forest Plan also known as the Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl, USDA and USDI 1994. The LRMP for the Mendocino incorporates standards and guidelines from the Northwest Forest Plan. Therefore this project is also compliant with the current survey and manage direction associated with the Northwest Forest Plan. The LRMP includes a Late Successional Reserve system, additional land allocations, survey and manage requirements, and standards and guidelines designed to maintain biological diversity by using an ecological approach to promote late successional and old growth dependent species. Direction consistency is discussed in Chapter 3 and Appendix D of this DEIS.

This DEIS was prepared under the direction of the joint Forest Service-Bureau of Land Management Aquatic Conservation Strategy guidance memo from May 22, 2007. This memo states that in order to make the finding that a project or management action “meets” or “does not prevent attainment” of the Aquatic Conservation Strategy objectives, the analysis must include a description of the existing condition, a description of the range of natural variability of the important physical and biological components of a given watershed, and how the proposed project or management action maintains the existing condition or moves it within the range of natural variability” (USDA and USDI 1994, Attachment B, p. B-10). This DEIS includes discussion on how the Pine Mountain Late-Successional Reserve Habitat Protection and Enhancement Project (Pine Mountain Project) is consistent with the Aquatic Conservation Strategy (see Appendix D, Riparian and Aquatic Ecosystems).

LRMP Specific Management Area Direction

The LRMP is comprised of a set of Forest goals and objectives, and standards and guidelines for each management area. This project is within Pine Mountain Management Area #20 (MA 20), Ericson Ridge Management Area #10 (MA 10) and Round Mountain Management Area # 8 (MA 8). The Pine Mountain Project is designed to be aligned with the direction from these management areas (LRMP pg. IV-112, 120, 162) including:

- Management emphasis in this area is on protecting and enhancing conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl (MA 20).
- All activities within this management area are to be implemented in accordance with the LSR management prescription (MA 20).
- Analyze existing OHV trail system within the management area, and eliminate or close OHV trails which have been shown to adversely affect the northern spotted owl or goshawk. Avoid constructing new OHV trails in suitable or potentially suitable spotted owl or goshawk

habitat. Do not permit organized OHV events within 1/2mile of northern spotted owl activity centers from February 1 thru July 31 and within 200 feet of northern spotted owl activity centers for the remainder of the year (MA 20).

- Develop road management objectives for maintenance and closure devices that are compatible with wildlife management objectives (MA 20).
- Emphasize fuels treatment in areas adjacent to and within plantations as a means of protecting future northern spotted owl and goshawk nesting habitat from wildfire (MA 8 and 10).
- Protect and utilize the known rust-resistant sugar pine to provide seed for rust-resistant seedlings (MA 20).

100-acre Late Successional Reserves

- These areas are comprised of one hundred acres of the best habitat around known spotted owl activity centers that are not protected by Congressionally Reserved Areas, Late-Successional Reserves, Riparian Reserves, Managed Late-Successional Areas, or Administratively Withdrawn Areas. This is intended to preserve an intensively used portion of the breeding season home range. "Activity center" is defined as an area of concentrated activity of either a pair of spotted owls or a territorial single owl. Timber management activities within the 100-acre area should comply with management guidelines for Late-Successional Reserves. Management around this area will be designed to reduce risks of natural disturbance. Because these areas are considered important to meeting objectives for species other than spotted owls, these areas are to be maintained even if they become no longer occupied by spotted owls. There is one 100 acre LSR within the Pine Mountain Project area.

LSRA Habitat Protection and Enhancement Guidelines

In the Pine Mountain Late Successional Reserve Assessment (LSRA) dated 2000; specific habitat management inside of the LSR is outlined as (A4-16):

- Small areas of hardwood-conifer forest type with dense canopy intermixed with existing late successional habitat could be managed to accelerate development of late successional forest. This would rapidly increase the quantity and quality of late successional and old growth habitat and improve the LSR's capability to support dependent wildlife species.
- Early and mid-successional hardwood-conifer and hardwood stands not intermixed with late successional habitat contain important habitat components for the maintenance of prey species and could be managed to improve prey species habitat. Reintroduction of fire into these stands could promote the maintenance of the oak component and could also slow the transitions to conifer stands.
- In the Revised Recovery Plan for the Northern Spotted Owl (Strix occidentalis caurina) dated June 28, 2011 pg. I-9 it states: "Vegetation management actions that may have short-term impacts but are potentially beneficial to occupied spotted owl sites in the long-term meet the goals of ecosystem conservation. Such actions may include silvicultural treatments that promote ecological restoration and are expected to reduce future losses of spotted owl habitat and improve overall forest ecosystem resilience to climate change, which should result in more habitat retained on the landscape for longer periods of time."

Current conditions

The Pine Mountain Project area, like many locations throughout the Mendocino National Forest, is especially vulnerable to wildfire. It has lost much of the historic fire resilience due to overcrowding of trees caused by fire suppression and only minimal management activities employed to control post harvesting regeneration response which began in the early 1950's and continued into the early 2000's.The current tree density is impacting and reducing late successional habitat quality including NSO nesting and foraging habitat, as the number of large diameter trees has decreased in relationship to increasing number of small diameter trees.

The existing condition is characterized by high tree densities (mainly of shade tolerant Douglas-firs) contributing to ladder fuel connectivity to the upper canopy levels,shaded out large hardwood trees and small area hardwood patches, and large and small diameter ponderosa pine trees.There are higher concentrations of live ladder fuels, greater amounts of dead standing trees and greater amounts of small diameter woody debris on the ground. In addition, when the large diameter pine trees fall out as individual or in clump concentrations, they take out some of the ladder fuel trees, resulting in heavy surface fuel concentrations around the downed larger pine trees. As a result, the potential for the project area to burn at high severity (where most mature trees are killed) has increased dramatically over historic conditions. The crucial interaction is that wildfires under current conditions are larger, more intense, erratic and difficult to control. Firefighter safety, ecosystem sustainability and late-successional species populations are all compromised.

Before Euro-American settlement, relatively frequent fires strongly influenced the composition, structure, and dynamics of the Pine Mountain Project forest ecosystems (Taylor and Skinner, 2003; Skinner and Chang 1996). These fires, mostly low to moderate in severity, caused changes by damaging or killing plants and setting the stage for regeneration and vegetation succession. They maintained surface fuels at fairly low levels, and in most areas kept forest understories relatively free of smaller trees that contribute to ladder fuels. In addition, fires influenced many processes in the soil and forest floor, including the organisms therein, by consuming organic matter, affecting nutrient cycling, and inducing other thermal and chemical changes (Agee 1993; Chang 1996). These fire effects in turn resulted in a wide array of effects onforest and wildlife habitat. Because fire influenced the dynamics of nearly all ecological processes (reduction of fire influence through the 20th century and into the 21st century) fire suppression efforts has had widespread ecosystem effects.

The dramatic reduction in area burned at low to moderate intensity has led to substantial increases in the quantity and changes in arrangement of live and dead fuels. While data from early 20th century is not available for the Pine Mountain Project, the Late Successional Reserve Assessment does provide information based on comparisons with early conditions characteristics of conifer stands within the Thomes Creek watershed (Buttermilk LSR) pre-fire suppression (1913) vs. post-fire suppression (1991) (USDA 2000, pgs. 14-15)

The Pine Mountain Project area is comprised of approximately 41% late successional habitat with about 10% of the area containing mixed chaparral habitat (Silviculture Report, USDA 2017b). Within the Pine Mountain project area past management activities and natural processes have resulted in increased tree densities, altered species composition (a shift from shade intolerant to shade tolerant species), and increased surface, ladder, and canopy fuels. In some areas these conditions result in a dense multistory forest that is a desirable characteristic of late successional habitat, in other areas these conditions are contributing to a decrease in biodiversity and declining forest health and resiliencyto inherent disturbances, such as fire, insects, and disease.Density related tree mortality and susceptibility to drought-induced tree mortality, because of intense between tree competition for resources (light, nutrients and water), is also occurring in large areas.

Ecological consequences of past land management practices also include:

- diminished late successional habitat for wildlife including the northern spotted owl;
- increased forest stand density with low-level growth and/or vigor;
- increased susceptibility of forest stands to insects and disease;
- changed species composition of forestlands, grasslands, chaparral, and oak woodlands;
- habitat alteration of forestlands, chaparral, oak woodlands, and grasslands (i.e. loss of biodiversity);and
- Increasing probability of larger more intense fires (Perry et al. 2011).

These consequences, which are a result of past land use management practices and natural processes, have led to a more homogenous forest (Perry et al. 2011) as well as an altered natural disturbance regime and substantial changes in late successional habitat required by NSO and many other species associated with late successional habitat.

Figure2. Dense forest within the Pine Mountain Project area. A current condition.


Figure 3. Another example of a dense homogenous stand of young Douglas-fir trees (i.e. very little stand diversity).

Figure 4.Shade tolerant Douglas-fir trees outcompeting old black oak. Black Oak also contains heritage artifacts, an old telephone line.

Late Successional Habitat

Late successional habitat provides habitat for a suite of species thus contributing to forest biodiversity. Some late successional species include: Pacific fisher, pileated woodpecker and goshawk. The most noted one being the northern spotted owl, which we will focus on primarily.

Northern Spotted Owl Nesting and Roosting Habitat

Critical Habitat, as stated in the Final Rule (USDI FWS 2012),forNSO nesting and roosting habitat is described as that which includes:

1. Moderate to high canopy cover (60 to over 80 percent);
2. Multilayered, multispecies canopies with large (20-30 in or greater dbh) overstory trees;
3. High basal area (greater than 240 ft^2/ac);
4. High diversity of different diameter of trees;
5. High incidence of large trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other evidence of decadence);
6. Large snags and large accumulations of fallen trees and other woody debris on the ground; and
7. Sufficient open space below the canopy for northern spotted owls to fly.

Roosting habitat provides thermoregulation, shelter, and cover to reduce predation risk while resting or foraging. Technically, roosting habitat differs from nesting habitat only in that it need not contain those specific structural features used for nesting (cavities, broken tops, and mistletoe platforms; USDI FWS 2012 pp 39).

As mentioned previously, the current conditions within the project area have pockets of NSO nesting and roosting characteristics, but over the landscape they have been greatly diminished by past management practices. Currently much of the area has very dense forested stands, whether it be a result of fire suppression and/or logging practices, this increase in tree density suppresses tree growth and increases the competition for nutrients and sunlight causing the larger trees to become less resilient to mortality factors (i.e. drought, insects and disease). The increase in stand density coupled with suppression of live trees has caused a decline in suitable nesting and roosting habitat for the owl. The owls rely on the larger and older trees with a high incidence of various deformities (USDI FWS 2012 pp 133) to support and protect a nest and young as well as for thermoregulation (USDI FWS 2012 pp 125). The increase in tree density (generally by shade tolerant species) hinders the owl's flight beneath the canopy decreasing the chance of a successful prey capture.

Northern Spotted Owl Foraging Habitat

Foraging habitat is essential in providing a food supply for survival and reproduction and is the most variable of all habitats used by northern spotted owls, and is closely tied to prey base (USDI FWS 2012 pp 39). Nesting and roosting habitat always provides for foraging, but in some cases owls also use more open and fragmented forests, especially in the southern portion of the range where some younger stands may have high prey abundance and structural attributes similar to those of older forests, such as moderate tree density, subcanopy perches at multiple levels, multilayered vegetation, or residual older trees (USDI FWS 2012 pp40). In the southern portion of the owl's range, in which Pine Mountain lies, woodrats are a major component of their diet. In the Pine Mountain project area, owls are more likely to use a variety of stands, including younger stands, brushy openings in older stands, and edges between forest types in response to higher prey density in some of these areas.

A more homogenous dense forestreduces the amount of available suitable foraging habitat for northern spotted owls. The conversion of these stands to more shade tolerant species causes a loss in diversity, both plant and animal, that would normally support the owls by providing adequate habitat for prey species. Brushy openings or low density forest patches within a mosaic of mature and older forests that would typically be used for foraging are lost, by both encroachment of shade tolerant trees as well as by competition for nutrients and sunlight. Heterogeneous forest conditions are beneficial for NSO and other wildlife species.

The current habitat available for NSO in the project area is exhibiting the above mentioned alterations. Nesting and roosting as well as foraging habitat is patchy across the landscape and not well connected.

Chaparral Habitat

In general, chaparral is considered an early-successional vegetation type because it quickly establishes on a site following a disturbance such as high intensity wildfire. However, stand characteristics within the chaparral vegetation type are not static and change over time. Thus, there are seral stages within the chaparral vegetation type. Various species of wildlife are dependent upon, or are more successful in early-, mid-, or late-seral chaparral. Black-tailed deer and Tule elk, for example, may benefit from having early-seral browse for summer forage, while the California thrasher and Dusky-footed wood rat populations increase in mature chaparral. Currently there is an unbalanced distribution of habitat within the project area skewed towards late-seral or mature chaparral. There is a need to expand the proportion of younger chaparral stands in order to increase stand age class diversity and protect the upslope late successional habitat within the Pine Mountain project. By breaking up the fuel continuity (i.e. increasing age class diversity) this may reduce the threat of high intensity fire entering the LSR (Fire and Fuels Specialist Report, USDA 2016c, on file location Upper Lake Ranger District).

Future desirable conditions

The Reference Community for the Pine Mountain Project area is the plant community that existed at the time of European immigration and settlement. It is the plant community that was best adapted to the unique combination of environmental factors associated with the site. This community was in dynamic equilibrium with its environment and was able to avoid displacement by the suite of disturbances and disturbance patterns that naturally occurred. Natural disturbances, such as drought, fire, animal and insect impacts, were inherent in the development and maintenance of these plant communities. The effects of these disturbances are part of the range of characteristics of the site that contribute to that dynamic equilibrium. Fluctuations in plant community structure and function caused by the effects of these natural disturbances establish the boundaries of dynamic equilibrium.Plant communities that are subjected to abnormal disturbances; physical site deterioration; or protection from natural influences for long periods, such as fire exclusion, seldom typify the historic Reference Community. Such communities may exist in a steady state that is very different from the historic Reference Community.

The historic vegetative conditions within the Pine Mountain Planning Area consisted of relatively open forested stands of predominately large, Douglas-fir, ponderosa and sugar pine and hardwoods. Field data and observations indicate these trees varied in distribution from widely spaced individuals or multiple trees arranged in a clump like distribution that contributed to an overall open canopy (40 to 60%) stand structure on the flatter ridge top or upper slope areas to closely space tree distribution on the lower slopes to near watercourse areas.

As stated in the northern spotted owl recovery plan forest management needs to be maintaining or improving ecosystem resilience in the face of climate change. Resilient forests are those that not only accommodate a gradual change related to climate but tend to return toward a prior condition after disturbance either naturally or with management assistance (Millar et al. 2007). Managing for resilient forest should also be considered a fundamental recovery goal for northern spotted owls. Federal land managers should apply ecological forestry principles where long term spotted owl recovery will benefit, even if short-term impacts to spotted owls may occur (Franklin et al 2007).

The Pine Mountain Late Successional Reserve Assessment (LSRA) identifies the project area as having a history of frequent, low-intensity fires (a fire return interval of 12-15 years). In most of the recent larger fires, portions have burned at a higher intensity, as a result of fire suppression (Fire and Fuels Specialist Report, USDA 2016c). The LSRA rated the fuels hazard as moderate, however the current project analysis for the project area rated this area as having a high fuels hazard (Fire and Fuels Specialist Report, USDA 2016c). Future desirable conditions are a reduced fire hazard rating.

Future desirable conditions as described in the Mendocino National Forest Land and Resource Management Plan (LRMP) include an increase of spotted owl habitat capability as well as increased habitat for species that depend on older forests. Future desired conditions include a decrease in the size/intensity of wildfires and a decrease in potential for substantial losses from major outbreaks of insects such as pine beetles and disease. Desired conditions should lead to restoration of ecological processes and protection and enhancement of late successional habitat.

Figure 5. Example of late successional habitat within the Pine Mountain Project area. A current and desired condition.

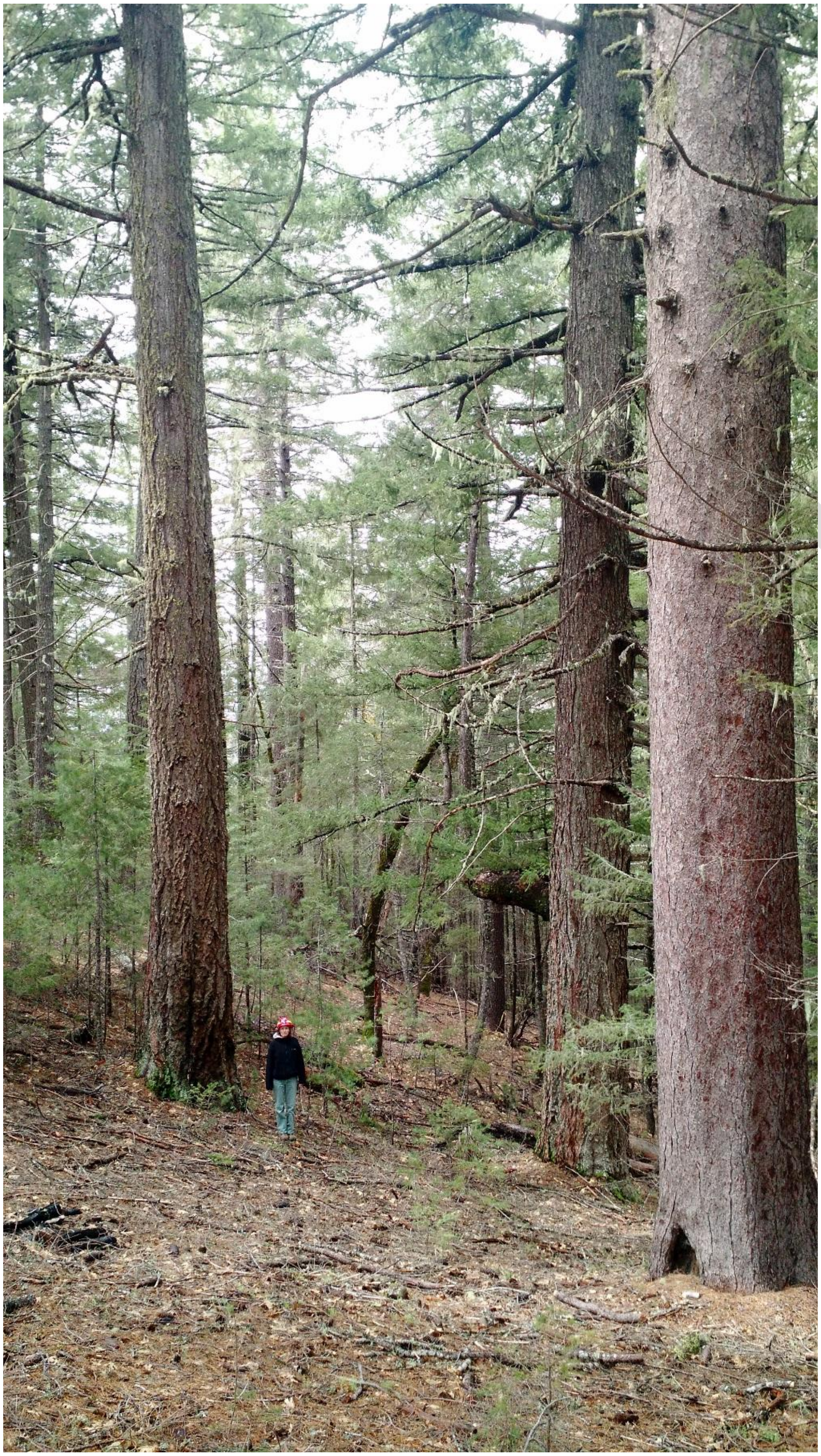

Figure 6. This is the desired condition as well as a current condition in the Pine Mountain Project area. An example of what the proposed project would be protecting.

Purpose

The primary purpose of the proposed Pine Mountain project is to protect and enhance late successional habitat and associated species including the northern spotted owl. By putting the landscape on a trajectory where characteristic fire regimes and processes can return and ecological processes are eventually restored. Silvicultural treatments (including prescribed fire) are being proposed to reduce stand density and increase the quality and amount of late successional habitat by increasing species diversity and average tree size. By reducing stand density, between-tree competition for resources will be reduced and the remaining trees will be more resilient to fire, insects, and disease. The remaining trees will also be more resilient to drought and warmer, drier periodswhich are anticipated due to climate change (IPCC 2014). Treatments are also being proposed to reduce ladder fuels and lessen overstory mortality in the event of a wildfire and break up fuel continuity in chaparral habitat to the west to better protect the LSR from fires entering from the west and southwest.

Need

The Pine Mountain LSR is one of the smaller LSRs within the Forest but provides an important link(i.e. connectivity) between the Blue Slides LSR seven miles to the southeast and the Sanhedrin LSR, 1.25 miles to the north. This LSR also provides a critical link to State and other Federal lands to the south and west. It is the last remaining largest southernmost functional patch of late successional habitat in the Inner California Coast Range of California. This area is currently part of Northern Spotted Owl Critical Habitat (Unit 11, Subunit ICC 5), a land allocation designated by US Fish and Wildlife Service, and also includes 1.6 miles of critical habitat for anadromous fish. These habitats are located within both the LSR and matrix lands. As such, there is a need to implement actions consistent with the LRMP, LSR assessment, and Northern Spotted Owl Recovery Plan guidelines to reduce the probability of large scale loss of Late Successional Habitat and protect this vital link between other areas of Late Successional Habitat.

Fire risk and hazard varies dramatically between the northern and southern portions of the Forest. Therefore, there is a need for fire risk and hazard reduction actions to protect habitat within the southern LSRs, (of which Pine Mountain is included) is of higher priority than the northern LSRs. Additionally, prescribed fire locations and priorities would be most effective when the following factors are considered: location and types of land use adjacent to the LSR; risk rating for the watershed; large fire frequency; and habitat at risk. Utilizing these factors, the Pine Mountain LSR…appears to be at the greatest risk to loss of existing and potential late successional habitat (USDA 2000).

Historic vegetation community dynamics within the mid- to upper-montane zone are believed to have been influenced by a fire regime characterized by fairly frequent low and mixed severity fires that created an open understory mixed conifer forest habitat across the project landscape (Skinner et al. 2006). Historically fires have thinned out competing species, recycled nutrients into the soil, released and scarified seeds, and opens holes in the forest canopy for sunlight to enter. All of these are critical to forest health, natural cycles of growth, decomposition and stand heterogeneity. Research in all these areas stresses the ecological importance of forest heterogeneity (North et al. 2009). Plant communities and ecosystems have evolved with and adapted to fire. This historic dynamic provided an ample supply of high quality habitat for many species including species that require late-successional habitat. Changes in vegetation dynamics caused by the alteration of the historic fire regime have caused a shift in tree density distribution and quality of habitat. The current existing condition tree density is impacting and lessoning late successional habitat quality including

Northern Spotted Owl nesting and foraging as the number of large diameter trees has decreased in relationship to increasing number of small diameter trees. Therefore there is a need to work towards increasing ecosystem resiliency by enhancing forest heterogeneity. See Silviculture Report (USDA 2017b).

The shift away from the historic reference community has increased the project susceptibility to uncharacteristic fire effects (Allen et al., 2002; Agee and Skinner, 2005; Peterson et al., 2005; Noss et al., 2006). Therefore there is a need for Silvicultural treatments designed to reduce the risks of large-scale disturbances, such as fire that can eliminate northern spotted owl habitat on hundreds or thousands of acres (LRMP 1995). The reference community forests embodied structural and compositional conditions resistant and resilient to fire (Fule, 2008; Stephens et al., 2008). The reference community forest persisted through numerous past disturbance events and through multiple centuries of climatic fluctuation (Agee, 1993; Allen et al., 2002).

The probability of severe fire disturbance today is much higher than under historic vegetative conditions. To evaluate the current conditions of lands in relation to their historic or "natural" reference condition, an interagency standardized assessment method, Fire Regime Condition Class (FRCC), was developed to describe the degree to which vegetation condition and structure, fire frequency and severity depart from natural or historical ecological reference conditions (Hann et al. 2005). Historically the Pine Mountain Project area fire regimes were within a range where the risk of losing key ecosystem components was low. Vegetation attributes (species composition and structure) were intact and functioning within the historical range. Most of the Pine Mountain Project Planning Area would be classified as a Fire Regime Group 1 where fire maintained ecosystems occur. Other areas would be classified as a Fire Regime 2 where fire initiated ecosystems (such as chaparral) occur. Fire Regime 1 is defined as *"a fire of a low severity burning in the area every 0-35 years"* (Rice 2006). Fire Regime 2 is defined as a fire occurring on a 0-35 year frequency with high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced). A study conducted in the early 1990s in the Upper Main Eel watershed (LSRA P12) concluded the natural fire return interval was 10-21 years, with fires of low-intensity ground fires, having flame lengths of less than four feet. Several other studies suggest that historical fire frequencies on the Forest ranged between 5-30 years some indicate a 5-12 year range in tree vegetation types (See Fire and Fuels Specialist Report, USDA 2016c, for detailed information). They were often followed by a pulse of conifer regeneration under the existing stand and density controlled by the repeated short term fire interval. However early in the twentieth century, fire suppression began to change the fire regime. Effective suppression efforts have virtually eliminated fire as a factor shaping vegetation within the Pine Mountain Project Area in the last 80-100 years and greatly altered the natural fire return interval, which is now significantly higher than the historic regimes. Currently forested stands within the Pine Mountain Planning Area would be largely classified as a Condition Class 3 (approximately 80% of the project area), the most extreme departure from the historic condition class. Approximately 20% of the project area is classified as Condition Class 2, with a moderate departure from the historic condition class. Fire frequencies have departed from historical frequencies by multiple return intervals. The result is a dramatic change to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range and the risk of losing key ecosystem components is high. Fire suppression efforts have changed the fire regimes from fire-maintained regimes to fire-initiated regimes. Changes have also occurred at locations where fire initiated regimes occur (such as in chaparral). When these fire regimes are altered it leads to a lack of diversity in seral stages.In fire initiated regimes, when a wildfire does occur, tend to burn much larger areas and set entire landscapes back to one seral stage. Departures in Fire Regimes have created a need to move the fire maintained regimes towards a Fire Regime 1 thus moving fire initiated ecosystems towards a more historic frequency and intensity which also mimics a more that allows for creating a diversity in seral stages (instead of setting an entire area back to one seral stage) and to protect the LSR. Thus having a desired dynamic natural disturbance regime and restoration of ecological process

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Active fire suppression has developed a vegetation mix very different today than it was when fires burned frequently. Fire suppression effects on vegetation characteristics has been to substantially increase both live and dead fuel loading. Effects on forested landscape characteristics has been to substantially increase timber stand density and alter timber stand structure. Effects are expressed in tree density and structural characteristics that increase ladder fuel connectivity and uncharacteristic latter fuel density. In addition, fire suppression has developed excessive to extreme ground fuel concentrations and abnormal canopy bulk density. High fuel loading in terms of ladder fuels and ground fuels produce higher intensity wildfires. Higher intensity wildfires increase larger diameter tree mortality rates or the occurrence of uncharacteristic wildfire events.Prior to fire suppression, low intensity wildfire kept ground fuels, small conifers, and hardwood and brush sprouts to levels that posed only a minor hazard to fire intensity. When fires did not occur to kill the resulting regeneration, the trees continued to grow. The continued growth developed forest stands that are multi-aged. Commonly there are two to three age classes represented. The smaller trees in the stand are often not younger; they are simply suppressed trees that were not competitive with the rest of their cohorts of the same age. Another effect attributed to the conifer regeneration is conifer intrusion into large diameter hardwood tree canopies or conifers overtopping hardwood trees. The effect is the shading out individual trees or small hardwood patches. If the oaks are suppressed by conifer competition for a long enough time, both the tops and root burls will die. The long-term survival of oaks as a natural component of the mixed conifer forest type depends upon their maintaining vigorous root (burl) structure, which allows for rapid sprout regeneration following a wildfire or other disturbance event. Enabling hardwoods to have a significant competitive regeneration advantage over conifer seedlings. (USDA 2000, pgs. 18-19). Therefore there is a need toreduce fuel loading and conifer (mainly Douglas-fir) density associated with hardwood canopies within the Pine Mountain Project area.

The Pine Mountain Planning Area has only experienced minor fire activity during the fire suppression era. However, the area surrounding the Pine Mountain Project has been subjected to large moderate, and high intensity stand replacing fires. Refer to the Fire and Fuels Specialist Report (USDA 2016c) for a more detailed information. Therefore there is a need to reintroduce fire into the Pine Mountain Project area.

Project area field examination indicates that forested stands are densely stocked resulting in a high level of inter-tree competition. Contributing to a loss of stand vigor leading to increasing susceptibility to forest pests, especially during prolonged periods of low precipitation. Existing conditions are trending to a reduction in biological diversity, developing higher fuel loads, and increasing fire danger impacting stand resilience to disturbance and sustainability. The increased density has led to a downward trend in the presence, establishment and health of sugar pine, ponderosa pine and black oak trees.Pine Mountain Project area forested stands had past management activities undertaken. Past timber harvest operations associated with this area were conducted in a manner that focused on high yield timber sales. Timber harvest operations ranged from partial removal of large diameter trees followed by natural regeneration; to later clear cutting operations followed by the establishment of tree plantations. The effects of these timber operations combined with fire suppression activities essentially enabled development within partially harvested areas of a dense understory small tree component that is expressed as an abnormal ladder fuel density and fragmented late-successional stands.Refer to the Silviculture Report (USDA 2017b).Forest health is a measure of a forest overall capacity to maintain biological diversity, normal productivity, sustainability, and resilience to disturbance especially in the face of changing climate conditions. There is a need to focus on increasing ecosystem resiliency. Restoration focuses on establishing the composition, structure, pattern, and ecological processes necessary to make terrestrial and aquatic ecosystems sustainable, resilient, and healthy under current and future conditions (North et al. 2009).

The LSRA identifies areas with high road densities that fragment wildlife habitat. Roads can also affect the natural hydrologic flow path, and, if not designed and maintained properly, can lead to significant erosion and mass wasting problems. There is an opportunity within this project to decommission or close roads that are no longer needed, and storm proof ones that will receive future use. There is a need to develop and manage a transportation system that minimizes the impacts of roads on the landscape.

Roads can be a significant source of non-point pollution to watersheds. Unmaintained or improperly designed roads can contribute a significant amount of sediment into streams through erosion of the road bed, fill slope, or inside ditch, as well as washouts caused by culvert failure (Best et al., 1995; Roni et al., 2008; Switalkski et al., 2004).

The project area has approximately 30 miles of road. Road treatments are proposed on approximately 19 miles of these roads. The last ~10 miles of roads in the action area will remain undisturbed and will not add to the effects of the roads actively used during project implementation. Roads proposed for decommission (total of 1.14 miles) within the Project Boundary. These include: 18N77, portions of 17N35, unnamed road to Pine Mountain spring, and Unnamed Road off of 18N05. These roads are hydrologically connected and are considered out-of-use roads. Decommissioning these roads will move us towards improving our aquatic habitat and help us better meet our ACS objectives.

Treatments are being designed to accomplish the following Purpose and Need objectives:

1. Enhance habitat for the Northern Spotted Owl and associated Late Successional species.
2. Reduce the risk to late-successional habitat loss from wildfire through vegetative treatments designed to modify and restore characteristic fire regimes and forest structure.
3. Improve forest health, vigor, and resilience to fire, insects and disease as well as enhance the diversity of plant and animal habitat found within the project area while restoring and enhancing late successional habitat.
4. Increase stand age class diversity of chaparral
5. Manage National Forest lands (including roads and trails) to meet the Aquatic Conservation Strategy Objectives and direction set forth in the Mendocino National Forest Land and Resource Management Plan (LRMP).

Objectives

Several objectives, tied to the LRMP and other guiding documents,and associated indicators were developed to evaluate how different alternatives meet the purpose and need of the project. Identified indicators help measure success of objects. The following objectives will be used to evaluate the alternatives:

Wildlife and Fisheries

"…Late-Successional Reserves (LSRs) are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems…." (LRMP, IV-62)

Indicator: Acres of LSR treated to protect late successional habitat and enhance habitat.

Indicator: Acres of nesting and foraging habitat (USF&W 2008)

Indicator: Acres of Late and Mature Seral Stages

Riparian and Aquatic Ecosystems

"Maintain and improve the ecological health of riparian and aquatic ecosystems" (LRMP, IV-3).

In addition to forests under the Timber Modified management prescription, the LRMP has designated Riparian Reserves (RRs) to be managed under the Minimal Management prescription. The LRMP standards and guidelines establish appropriate conditions to allow timber harvest within Riparian Reserves. They are to: "Apply silvicultural practices for riparian reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain aquatic conservation strategy objectives" (LRMP, IV-35). The current condition of forests within the Riparian Reserves is generally indistinguishable from upland or non-Riparian Reserve vegetation; there is very little true riparian vegetation in the riparian reserves within the project. The majority of the Riparian Reserves are buffers around intermittent streams containing chaparral or upland forest stands. These stands are currently undergoing high rates of competition that is increasing mortality in ponderosa pine, sugar pine, and black oak and decreasing growth and vigor of the overall stand. Further, as in upland stands, high accumulations of ladder fuels and surface fuels are present. The decreased growth and vigor and the high accumulations of ladder and surface fuels reduces the capacity of the riparian reserves to be resilient to "natural" disturbance regime thereby not attaining the aquatic conservation strategy objectives (LRMP, IV-30). There is a need to reduce fuels and densities of conifers in Riparian Reserves to improve their resilience.

Indicator: Acres of RRs treated to increase resilience to disturbance

Several roads are proposed for decommission (total of 1.14 miles) within the Project Boundary. These include: 18N77, portions of 17N35, unnamed road to Pine Mountain spring, and unnamed road off of 18N05. Some of these roads are hydrologically connected and all are considered out-of-use roads. These road are intercepting ground water and affecting the physical integrity of the aquatic system. There is a need to reduce or eliminate to the extent possible the effects of this road on the aquatic system.

Indicator: Miles of road decommissioned to meet ACS objectives

New temporary roads are needed to improve access to areas to be treated. Although mitigation measures would be used to minimize the impact of new temporary roads, and the roads decommissioned after use, there could be short to mid-term impacts to aquatic systems if the road is adjacent to or crosses a water course.

Indicator: Miles of new temporary road constructed and decommissioned after use.

Chaparral

"Bring suitable chaparral lands under management to capture potential range, wildlife, recreation, and watershed benefits and to reduce the risk of large costly wildfires." (LRMP, IV-2)

The LRMP includes a Chaparral Management Prescription (Rx 3) in which states that "this prescription provides for a variety of resource objectives in chaparral lands including wildlife, range, watershed, and fuels management through a rotational prescribed burning program or other vegetation treatment techniques" (LRMP, IV-58). The existing and desired seral distribution of chaparral are described in the Silviculture Report (USDA 2017b).

In general, chaparral is considered an early-successional vegetation type because it quickly establishes on a site following a disturbance such as high intensity wildfire. However, stand characteristics within the chaparral vegetation type are not static and change over time. Thus, there are seral stages within the chaparral vegetation type. As described under the current conditions for chaparral discussed above, there is an unbalanced distribution of habitat within the project area skewed towards late-seral or mature chaparral. There is a need to increase the proportion of younger chaparral stands.

Indicator: Acres of chaparral burned to increase the proportion of younger chaparral seral stages.

Fire and Fuels

Maintain a cost effective detection, prevention, suppression, and fuels management program mix in support of other resource programs. (MNF LRMP IV-2)

In order to accomplish that goal, the LRMP emphasizes “fuel treatment efforts for fire hazard reduction purposes in the following areas (LRMP IV - 20):

Natural fuels:

- Continuous, mature brush stands of more than 150 acres adjacent to or within areas of urban interface, resource investments, or high fire hazards;
- Continuous, mature brush stands more than 25 years old;
- Continuous, mature brush stands with dead-to-live ratios greater than 35%.
- Forested areas with excessive accumulations of natural fuels.

Activity fuels:

- In zones of urban interface or other high fire hazard areas.

Fire activity types fall into the following three categories: Surface Fire, Torching and Crowning. Both crown fires and torching of trees translate to mortality of a majority of the trees experiencing these two types of fire activity. Canopy fires are much more difficult to suppress and pose greater danger to suppression resources. The effects resulting from fire suppression tactics are generally much more impactful to natural resources under crowning and torching activity.

Indicator: Fire Activity Type measured as percentage of areas expected to have surface fires.

Fireline intensity is used as a means to relate visible fire characteristics and interpret general suppression strategies. One visual indicator of fireline intensity is flame length (Rothermel 1983). In general, when flame lengths are less than 4 feet, direct attack at the head and flanks is possible and suppression strategies such as handlines and hoselays should stop spread of fire. When flame lengths are greater than 4 feet, fires are too intense for direct attack strategies. Only natural ignitions within designated Wilderness areas are allowed to be managed for multiple resource objectives, therefore for a fire in the project area suppression would have to occur. If the fire can be stopped using handlines and hoselays, the resource damage due to suppression activities would be much less. The table below shows relation between fires intensity, flame length, and expected suppression strategies.

Fireline Intensity	**Flame Length**	**Interpretations**
Low	< 4 feet	Direct attack at the head and flanks with hand crews; handlines should stop spread of fire
Moderate	4-8 feet	Fires are too intense for direct attack on the head by persons using handtools. Handline cannot be relied on to stop fire spread. Equipment such as dozers, engines, and retardant aircraft can be effective.
High	8-11 feet	Fires may present serious control problems-torching, crowning, and spotting. Control efforts at the fire head likely ineffective. This fire would require indirect attack methods
Very High	>11 feet	Crowning, spotting, and major fire runs are probable; control efforts at the head are likely ineffective. This fire would require indirect attack methods

Indicator: Flame Length/Fire Intensity measured as percent of area expected to be less than 4 feet.

Shaded fuel break construction in the project area is being designed, following direction provided by the LSRA, to help protect the late successional habitat by allowing an area of deployment and firefighting tactics in the case of a wildfire within the Pine Mountain project area. This fuel break is also strategically placed to provide a buffer against fires originating from the west and moving eastward with the prevailing winds. This break in fuel will also assist in prescribed fire activities.

Indicator: Miles of shaded fuel break constructed or improved.

Forest Health

“Provide an integrated pest management program to prevent or control insect and disease outbreaks on forest and rangeland resources” (LRMP, IV-2).

Additionally, the LRMP recommends the use of commercial thinning as an intermediate harvest: “…where they are necessary to achieve stocking control and to increase the total yields of useful material from a stand when it can be shown to be economical or where necessary for forest health” (LRMP, IV-38). Within the project area, mixed conifer stands of Douglas-fir, ponderosa pine, and sugar pine are compositionally shifting towards Douglas-fir as the individuals and patches of ponderosa pine and sugar pine decline and die from competition induced stress and subsequent attack from western bark beetle. Competition induced insect attack is a symptom of overstocking. There is a need to reduce stocking levels in order to make stands more resilient to disturbances like insects, disease, drought, and fire.

Indicator: Acres of mixed conifer stands with stocking levels reduced to a healthier more resilient density.

Within the project area, approximately 700 acres of plantations between the ages of 10 and 25 years are experiencing increased inter-tree and chaparral competition. Regulated timber yields from plantations on suitable timber lands are a specific Management Direction within the Timber Modified management prescription. Ensuring future yields from plantations is partially achieved by releasing “seedlings from competing vegetation in plantations as needed to meet expected growth rates” (LRMP, IV-70). There is a need to reduce competition in plantations to increase growth rates.

Indicator: Plantation acres treated to reduce competition.

Stand Density Index (SDI) is a method of characterizing stand density that uses both tree diameter at breast height (DBH) and trees per acre (TPA). SDI, developed by Dunning and Reineke (1933)**,** provides a measurable means to establish the relationship between current stocking and the potential maximum stocking. SDI can also be used as a species-specific measure of tree competition for resources (nutrients, water, and sunlight). SDI has an advantage over basal area because it is not significantly affected by age and site quality (see vegetation section on SDI).

Indicator: Stand Density Index

Comply with Direction, Forest Service Policy, Regulations, and Laws

Management Direction within the Mendocino National Forest LRMP includes Forest Goals, Standards and Guidelines, Management Prescriptions, Management Areas, and Supplemental Management Area Direction. Compliance with this Direction is required for any action taken on the Mendocino National Forest. Additionally, compliance is required with other applicable requirements including Forest Service policy, regulations, and laws.

Indicator: Compliance with Forest Plan management direction, as documented in Appendix B.

Indicator: Compliance with other applicable requirements, as documented in Chapter 3 – Environmental Consequences.

Decision Framework

The Forest Supervisor of the Mendocino National Forest is the Responsible Official for land administered by the USDA Forest Service. This DEIS is not a decision document. Its main purpose is to publicly disclose the environmental analysis conducted, as well as the Proposed Action and the alternatives’ potential consequences on the human environment; providing an important context for subsequent federal decision-making. Accordingly, the Pine Mountain LSR Protection and Enhancement Project DEIS focuson providing analysis sufficient to facilitate the following federal decision:

- What direction is needed to achieve desired conditions highlighted within the Land and Resource Management Plan (LRMP) and include increased areas for species that depend on older seral stage forests, and size/intensity of wildfires to decrease?

- What mitigation and monitoring measures would be required, if an action alternative is developed?

- Are the measurement indicators adequately addressed?

Given the purpose and need, the deciding official reviews the proposed action, the other alternatives, and their environmental consequences, in order to determine whether to implement the proposed action as described, select a different alternative or take no action at this time.

Public Involvement

Scoping

The Council on Environmental Quality (CEQ) defines scoping as “...an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action'' (40 CFR 1501.7). Among other things, the scoping process is used to invite public participation, to help identify public issues, and to obtain public comment at various stages of the environmental analysis process

This project was initially proposed in 2006. The Pine Mountain project has been listed on the Mendocino National Forest Schedule of Proposed Actions (SOPA) since April 2006. A scoping letter was sent out to solicit comment based on the original proposal. The Forest had a turnover of staff and the project was not a priority project for 3 years until 2014. A new proposed action was discussed and the team based on the current condition had agreed to the second set of proposed action. Though the name of the project remains the same and the general treatment area is unchanged, the second set proposed actions is quite different from the original. The Forest published a Notice of Intent (NOI) to prepare an Environmental Impact Statement for the Pine Mountain Project in the Federal Register on May 20, 2014. The notice asked that comments on the proposed action be received by June 19, 2014. On May 15, 2014, a scoping package providing information and seeking public comment on the proposed action was mailed to approximately 93 individuals and groups. This included federal and state agencies, Native American groups, local government officials, businesses, interest groups, adjacent landowners, and other individuals.

In addition, as a part of the public involvement process, the Forest Service held a field trip on May 30, 2014. The second scoping effort resulted in a total of 8 individuals and organizations comments on the proposed action.

Collaboration

The collaborative process is ongoing. Various interested individuals and groups have visited the site with the Forest staff to develop the details of the proposed action and what outcomethe project intended to achieve. Information from the collaborative effort (Mendocino FIRESCAPE) was used to help develop the proposed action. A document to analyze scoping comments and identify issues raised by the public ismentioned below in the issues section of the DEIS, also in the project record. A copy of the project record can be found at the Upper Lake Ranger District Office.

Issues

Comments frominterested public and other agencies were used to formulate issues concerning the proposed actions. The Forest Service separated the issues into two groups: significant and non-significant. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-significant issues and reasons why they were found non-significant may be found in the project record located at the Upper Lake Ranger District.

The Forest Service identified the following significant issues during scoping:

Issue 1 - Roads: negative impact from creating new roads will affect hydrology, aquatic and terrestrialspecies. Refrain from any road construction/reconstruction or opening undesignated roads

Response: Roads and temporary roads have the potential to increase sediment loading to streams. Appropriate design features can lower or eliminate the risk of these effects; design features and an alternative intended to reduce effects to aquatic habitat are being developed.

Issue 2 –Old growth: Retain all legacy old growth and large old (late successional) fire resistant trees, retain adequate canopy for old growth related species.

Response: The current proposed action will not take out any legacy old growth or large old (late successional) fire resistant trees and maintains canopy closure at levels defined for habitat requirements.

Issue 3 - Retain habitat wildlife connectivity:refrain from degradation of any suitable spotted owl habitat.

Response: The proposed treatments would not break up wildlife connectivity; the goal is to improve the habitat by treating excessive fuels. The NSO habitat will maintain the same class, not downgraded or degraded.

Issue 4 - Concentrate on small (less than 21 inches dbh) diameter thinning: impose a diameter limit in veg treatment.

Response: All of the action alternatives are focused on removal of trees less than 21 inches dbh. Therefore, this issue was not carried forward as an alternative.

Issue 5 - Consideration of additional alternative to be analyzed that would require no more than two entries, including this one, to meet your long term stands characteristics.

Response: The thinning treatment is designed to be accomplished with one entry. The fuel treatment will require multiple entries over time due to desirable burning condition and short prescribe burning window.

Issue 6 - Evaluate a range of alternatives, including an alternative which minimizes adverse impacts to water quality, cumulative watershed effects, aquatic resources, and air quality.

Response: this comment was not specific. Alternative 3, 4 and 5 are developed to emphasize different resource objectives. See chapter 2 the alternatives section of the DEIS for details.

Changes to proposed action (alternative 2) following 2014 scoping comment period

In the 2014 scoping notice, the proposed action included a designation of 0.3 miles of non-system roads as trail and a 17.6 miles closure of non- system trails. The non- system trails were closed in a region wide route study. Due to prior administrative action taken already outside of the scope this project, these two proposed actions were deleted from this environmental analysis. This modification of the proposed action is incorporated in the analysis of all specialist reports(https://www.fs.usda.gov/project/?project=13615 and on file in Upper Lake Ranger District Office)

Chapter 2. Alternatives, Including the Proposed Action

Introduction

This chapter describes and compares the alternatives considered for the Pine Mountain project. It describes both alternatives considered in detail and those eliminated from detailed study. The end of this chapter presents the alternatives in tabular format (table 1) so that the alternatives and their environmental impacts can be readily compared.

Alternatives Considered in Detail

Based on the issues identified through public comment on the proposed action, the Forest Service developed 3 alternative proposals that achieve the purpose and need differently than the proposed action. In addition, the Forest Service is required to analyze a No Action alternative. The proposed action, alternatives and no action alternative are described in detail below.

Alternative 1: No action alternative

Under Alternative 1, no fuels treatments or forest health would be implemented to accomplish the purpose and need. The intent and the desired condition set forth the LRMP and NWFP would not be achieved. While no costs would be directly incurred with this alternative, future costs may include extensive wildfire suppression (as suppression is the only response allowed outside of designated Wilderness) and rehabilitation activities and potential loss of late successional habitat. Maintenance related to safety would continue to take place as needed.

While this alternative takes no action at this time, on-going activities such as routine road maintenance, fire suppression, and recreation may still occur in this area. This alternative serves as a baseline against which to compare the other action alternatives. See Table 1a - 1c for comparison of alternatives.

Alternative 2: The Proposed Action

Alternative 2, the proposed action, would include prescribed fire and forest health treatments that focus on enhancing and maintaining vegetative communities for wildlife habitat. Plant community health and biodiversity would be enhanced by applying ecological fuel reduction treatments. Ecological fuel reduction seeks to reduce surface fuels, ladder fuels, and crown density in forested plant communities (approximately 7010 acres). In chaparral plant communities (approximately 990 acres), ecological fuel reduction would be used to retain, enhance and protect portions of this valuable habitat while still reducing and modifying fire behavior through prescribed fire treatments that result in a mosaic of burned and unburned areas. Ecological fuel reduction techniques assist the natural environment in becoming more biodiverse, healthier and more resilient and helps in restoration of ecological processes.

Ecological fuel treatments would be applied as prescribed fire only or as a combination of prescribed fire plus hand or mechanical thinning, piling and pile burning. Mechanical treatments will be followed by periodic understory burning to further reduce surface fuels, activity fuels, or to maintain fuels in the desired condition. Where prescribed burning is used, several entries may be needed to achieve desired conditions. For example, areas may require thinning, piling and pile burning prior to understory burning in order to meet objectives. Or understory burning may require a post thinning activity to reduce standing dead fuels and further need to be understory burning again to reduce the newly accumulated surface fuel loading.

Alternative 2 treatments are designed to be site-specific, taking into consideration vegetation, slope, aspect, forest health needs and land allocation objectives. Careful planning and consideration ensures that what remains standing is healthy, resilient and compatible with LSR objectives.See Table 1a - 1c for comparison of alternatives and Appendix C for maps.

LRMP Guidance Vegetation Prescriptions:
The Pine Mountain Project area following prescriptions would apply to lands designated as Late Successional Reserve, Known Spotted Owl Activity Centers (100 acre Late Successional Areas), Riparian Reserve and Matrix.

Prescription standards were developed taking into consideration:
- Late-Successional Reserve prescription RX 6 (5,853 acres),
- Minimal Management prescription Rx 4 (i.e. Riparian Reserves) (5093 acres),
- Chaparral Management RX 3 (1822 acres) and
- Timber Modified RX 7 (Matrix Land) (2147 acres).

Alternative 2 treatments would accomplishes the Riparian Reserve Minimal Management prescription RX-4 and Aquatic Conservation Strategy Objectives by emphasizing the need within Riparian Reserve SMZ areas for low intensity management (LRMP 1995).

Alternative 2 treatments would accomplishes the Timber Modified management prescription RX 7 goals by emphasizing the need within the Matrix land allocation to provide for wildlife resource objectives.

List of Treatments
Treatment Prescription 1 - Ecological Fuel Reduction Treatment -- Plantations Areas
Treatment Prescription 2 - Ecological Fuel Reduction Treatment -- Naturally Forested Areas
Treatment Prescription 3 –Ecological Fuel Reduction Treatment -- Commercial Thinning
Treatment Prescription 4 - Ecological Fuel Reduction Treatment -- Shaded Fuel Break
Treatment Prescription 5 - Ecological Fuel Reduction Treatment -- Chaparral Management
Treatment Prescription 6 - Ecological Fuel Reduction Treatment -- Back Fire Area
Treatment Prescription 7 - Riparian Reserve Management

<u>A1 Treatment Prescription 1 - Ecological Fuel Reduction Treatment Plantations Areas</u>
Treatment 1 is a thinning treatment prescription that is a fuel reduction treatment focused on treating previously established early succession plantation stands. The treatment will be applied to trees that depending on market conditions may have value as biomass products, but do not have a commercial value as lumber products.

This treatment applies to land designated as Late Successional Reserve, Known Spotted Owl Activity Centers (100 acre Late Successional Areas), Riparian Reserve and Matrix encompassing 364 acres. Refer to Table A1. Proposed Treatment Prescriptions Acreage by Land Allocations. Fuel treatments may be applied as prescribed fire only or as a combination of prescribed burning, hand or mechanical density reduction (thinning), hand or mechanical piling, or chipping. Treatments may be followed on an as needed basis by thinning and prescribed fire to reduce surface fuels or maintain them in the desired condition.

A1.1 Thinning Treatment

The thinning treatment shall be applied to reduce the number of trees per acre. Residual tree spacing shall range from approximately 15-30 feet. Spacing may vary by 25% less or greater than the expressed range to allow for variability of density and selection of the best leave trees. Implementation may be by hand (chainsaw) or mechanized equipment (i.e. masticator or feller-buncher), depending upon slope constraints as described in the design features.

Retain the largest and most vigorous trees. The desired leave tree selection priority is as follows: hardwoods, sugar pine, Douglas-fir, and ponderosa pine. Retained hardwood sprout clumps should be thinned to retain the 2-3 most vigorous, dominant sprouts. Prune the lower branches of leave trees as needed to raise the canopy height and reduce ladder fuels. Where available retain any existing predominant tree.

Where feasible, avoid thinning pine-dominated plantations between February 1 and July 15 to avoid creating conditions for potential bark beetle breeding and outbreaks, unless slash can be promptly disposed of by chipping, mastication, removal or burning.

A1.2 Snag Retention

No snags >10” DBH shall be felled, unless deemed a safety hazard or risk to prescribed fire control. Hazardous snags will be felled and remain on site as coarse woody debris (CWD).

Back Fire Exception:
For those units, or portions thereof, that were affected by the 2008 Back Fire retain a minimum of 4 large snags per acre minimum diameter 15 inches and preferably >20inches DBH, unless deemed a safety hazard; if there are less than 4 snags/acre >20” DBH, retain the 4 largest snags available (Late-Successional Reserve Assessment, pg. 52).

A1.3 Coarse Woody Debris retention (CWD)

Retain existing large CWD ($\geq$20 inches in diameter, or largest available) up to a total of 5-10 tons/acre.

A1.4 Surface and Ladder Fuel Treatments

Slashing/fuels treatments:
Treated material would consist of existing surface downed woody debris and slash created from thinning treatments. Material would either be chipped and distributed throughout the treatment area, burned on site in piles (hand or mechanically piled), or taken off site. Trees may be pruned to raise canopy base height.

A1.5 Riparian Reserve Treatments

Refer to **Treatment Prescription 7 Riparian Reserve Management** for specific operations within Riparian Reserve.

A2 Treatment Prescription 2 - Ecological Fuel Reduction Treatment -- Naturally Forested Areas

Treatment 2 is an understory thinning prescription that is a fuel reduction treatment applied to forested areas that express early, mid or late successional structure. The treatment will be applied to trees that depending on market conditions may have value as biomass products, but do not have a commercial value as lumber products.

This treatment applies to land designated as Late Successional Reserve, Known Spotted Owl Activity Centers (100 acre Late Successional Areas), Riparian Reserve and Matrix encompassing 3523 acres. Refer to A1. Proposed Treatment Prescriptions Acreage by Land Allocations. Treatment 2 may be applied as prescribed fire only or as a combination of prescribed burning, hand or mechanical density reduction (thinning), hand or mechanical piling, chipping, or pile burning. Treatment 2 may be followed on an as needed basis by prescribed fire to reduce surface fuels including activity fuels and maintain them in the desired condition.

A2.1 Understory Thinning

Where natural stand development has created areas that contain trees less than or equal to 10 inches DBH, understory thinning shall focus on the reduction of trees less than or equal to 10 inches DBH. Residual trees within these areas may be spaced15-20 feet in the understory of larger trees as long as there is spatial crown separation between the base of the upper canopy and lower canopy trees. Leave trees should not have potential to grow into the canopy of larger diameter dominate or co-dominate trees. Spacing may vary by 25% to allow for variability of density and selection of the best leave trees. Implementation may be by hand (chainsaw) or mechanized equipment (i.e. masticator or feller-buncher), depending upon slope constraints as described in the design features.

Retain the largest and most vigorous trees. The desired leave tree priority would be as follows: hardwoods, sugar pine, ponderosa pine, and Douglas-fir. Retained hardwood sprout clumps should be thinned to retain the 2-3 most vigorous, dominant sprouts. Prune the lower branches of leave trees as needed to raise the canopy height and reduce ladder fuels. Retain any existing predominant trees where available.

Where feasible, avoid thinning pine-dominant areas between February 1 and July 15 to avoid creating conditions for potential bark beetle breeding and outbreaks, unless slash can be promptly disposed of by chipping, mastication, removal or burning.

Exception Clearance around Individual Trees: Trees less than 20 inches DBH may be removed from around individual large diameter conifer trees and hardwood species. This treatment may enhance individual tree growth potential and longevity. When removal is applied to trees that are of size to provide large woody debris, they may be left to enhance woody debris retention where needed.

A2.2 Snag Retention

No snags >10 Inches DBH shall be felled, unless deemed a safety hazard or risk to prescribed fire control. Hazardous snags will be felled and remain on site as coarse woody debris (CWD).

Back Fire Exception: For those units, or portions thereof, that were affected by the 2008 Back Fire retain a minimum of 4 snags >20" DBH, unless deemed a safety hazard. If there are less than 4 snags/acre >20" DBH, retain the 4 largest snags available (Late-Successional Reserve Assessment, pg. 52).

A2.3 Coarse Woody Debris retention (CWD)

Retain existing large CWD (>20" diameter, or largest available) up to a total of 5-10 tons/acre.

A2.4 Surface and Ladder Fuel Treatments

Slashing/fuels treatments
Treated material would consist of surface downed woody debris and slash created from thinning treatments. Material would either be chipped and distributed throughout the treatment area, burned on site in piles (hand or mechanically piled), jackpot or understory burned, or taken off site. Treatment objective maintain 5-10 tons/acre. Trees may be pruned to raise canopy base height.

A2.5 Riparian Reserve Treatments

Refer to **Treatment Prescription 7 Riparian Reserve Management** for specific operations within Riparian Reserve.

A3 Treatment Prescription 3 –Ecological Fuel Reduction Treatment -- Commercial Thinning

The initial treatment follows LSRA guidelines to treat within forested areas to protect forested areas before treating bordering non-forested areas. (USDA 2000, pg. 45) This treatment prescription will be applied to various forested areas that express mid or late successional structure which are located on or near ridgetops or upper slopes. Treatment operations would utilize whole tree removal methods, or removal of the last log with tops still attached. Tree removal will be accomplished by a ground-based system. Activity fuels not brought to the landing during operations may be hand or machine piled and burned if levels exceed desirable surface loading for subsequent prescribed underburning. Slash brought to the landing would be burned on site or utilized as biomass feedstock in on or off site processors, or returned to the various locations within the units. When activity fuels are relocated within the unit they may be treated by burning or left in place as CWD. Post-harvest prescribed underburning would be utilized to further reduce fuel loading.

The intent of the prescription is to promote or sustain late successional habitat by working within current stand heterogeneity. The current heterogeneity is expressed in the variable density found in stand structure as related to tree size distribution, stem spatial patterns, species composition and stand dynamic processes (growth, mortality and regeneration). Ecological enhancement thinning will incorporate the intermediate silvicultural practice thinning from below combined with certain aspects of variable density thinning.

Applied ecological enhancement thinning treatments aim to enhance biodiversity through focusing tree retention on leave trees that provide habitat with structural diversity more suitable to late successional species. Ecological enhancement thinning addresses appropriate tree density reduction to open the lower story canopy to enhance NSO habitat, reduce competition and develop resiliency.

A3.1 Thinning from Below with a Variable Retention Objective

Thinning From Below is a silvicultural technique in which lower story trees (usually subdominant trees) are removed. The objective is to reduce the density by increasing the spatial separation between the trees that make up the lower story canopy and the trees that make up the upper story canopy.

Thinning from below will serve to reduce ladder fuels, help raise stand height to crown base, and separate overstory tree crowns from lower story tree crown. Only minor removal of codominant trees which along with dominant and predominant trees provide the canopy structure characteristic that expresses suitable NSO and late successional habitat. No dominant or predominant trees will be removed.

A3.2 Variable density thinning:

Variable density thinning is a thinning approach used to create, sustain or restore spatial, structural and compositional heterogeneity throughout the stand. Thinning shall strive to maintain the current mosaic of variable species composition and habitat niches. This approach modifies a traditional thin from below so that a stand is not uniform following treatment. Variable density thinning concept strives for variation in the residual stand, not uniformity.

Elements of variable density thinning that will be incorporated into this project to create or enhance spatial heterogeneity in composition and structure similar to that found in late-successional forests include:

1. Different thinning intensities among units based on seral stage and whether the stand is northern spotted owl nesting/ roosting, foraging or dispersal habitat

2. Some portions of the stand may not be entered to remove trees greater than 10 inches, but may have tree less than or equal to 10 inches removed. Also, prescribed fire may be applied. (Skips).

3. Some portions of the stand may favor hardwood group retention.

4. Some portions of the stand may have lesser spacing retention objectives for large diameter trees and larger spacing retention objectives for smaller diameter trees.

5. Some portions of the stand may have a requirement for greater clearance around a particular tree species.

The proposed thinning would be applied on approximately 1702 acres of mixed conifer stands. Refer to Table A1. Proposed Treatment Prescriptions Acreage by Land Allocations. The treatment goal is to sustain a stand that:

1) Continues to provide spotted owl habitat;
2) Provides habitat for other late-successional species;
3) Is more resilient to fire;
4) Possesses, protects and develops an adequate component of larger trees with cavities and defects for nesting/roosting structures, foraging opportunities and dispersal qualities; and

5) Is of appropriate density to maintain the stand in a reasonably vigorous and healthy condition to extend the retention of the large, mature trees and other attributes of suitable late successional habitat such as snags and coarse woody debris(CWD) for as long as possible.

The treatment focus is to retain the largest trees that express late seral elements and promote healthy black oak and madrone trees wherever possible. The larger diameter trees are generally at or above the average canopy and have the best opportunity to take advantage of onsite resources to maintain or increase growth. The larger diameter trees generally express a higher degree of fire resiliency. Treatments are designed to maintain the existing native species diversity, including hardwoods, within the unit being treated. The treatment will emphasize retaining the following types of trees:

- All pre-dominant conifer trees (larger, older trees left from previous stands that express late seral structural elements such as large branches, cavities and other structures suitable for nesting, denning and resting), and diameters generally greater than 39 inches DBH;
- All dominant conifer trees as required by the LSRA. Tree diameters are generally 30 to 38 inches DBH;
- Codominant and intermediate conifer trees with growing space in the canopy for crown development. These trees express live crown ratios generally greater than 30 percent and diameters generally less than 30 inches;
- Healthy dominant or codominant hardwood trees (particularly black oak and Pacific madrone).

The treatment will develop species specific retention areas and species specific individual tree growing space enhancement:

- **Retention Areas (Skips):** These areas will not be treated to remove trees greater than 10 inches DBH. They are small areas generally one half acre to two and a half acres which contain coarse woody debris (CWD) concentrations, or hardwood concentration not requiring treatment to reduce conifer encroachment. These areas may be included in prescribed fire treatments.

- **Hardwood Retention Group Areas:** Hardwood retention group areas will be prescribed with the removal of encroaching conifer that are over topping the hardwoods and impeding their growth and vigor. Conifer trees will be removed from beneath the drip line and out to a distance of 5 feet from the hardwood crowns to enhance sunlight and growing space.

- **Variable Spacing Retention Objectives:** The retention objective for larger diameter trees shall focus on shorter spacing distance to maintain canopy closure. Smaller diameter trees spacing distances will focus on larger spacing distances to develop crown and stem diameter to encourage and to enhance late seral habitat structural characteristics.
- **Clearance Around Individual Trees:** Individual large diameter ponderosa pine, sugar pine and hardwood species with black oak being the predominant large diameter hardwood species shall be treated to enhance their growth potential and longevity by removing trees from the east, south and western quadrants to cause crown separation of a minimum of five feet from nearby trees canopies.

First priority for removal would be the smaller trees generally 20 inches DBH or less. These trees were established as a result of past harvest activities, or other disturbances. They are usually present below the average canopy and are impacting the larger diameter trees as a result of competition for light, water, and nutrients. Some codominant trees would also be removed to increase growth of adjacent trees and to meet the desired residual stand density. Generally, the following types of trees would be removed from the stand:

- Suppressed conifers (diameters generally less than 14 inches);
- Intermediate conifers without growing space in the canopy for crown development (diameters generally less than 20 inches);
- Codominant conifers that do not have growing space in the canopy for further crown development (diameters generally less than 24 inches), or
- Codominant trees needed to reduce stand density to desired levels; and
- Codominant, intermediate, and suppressed conifers adjacent to pre-dominant conifers, or dominant / codominant hardwoods, to enhance survival of theses leave trees.

The treatment will retain wildlife habitat elements:

- **Snags:** Retain all snags >20” DBH, unless deemed a safety hazard or which have the potential to spread fire (fall/spot) across control lines. Hazardous snags and snags >20 inches DBH felled to facilitate burning operation will be retained as coarse woody debris (CWD).
- **Coarse Woody Debris:** Retain existing large CWD (>20” diameter, or largest available) up to a total of 5-10 tons/acre.

A3.3 Riparian Reserve Treatments

Refer to **Treatment Prescription 7 Riparian Reserve Management** for specific operations within Riparian Reserve.

A4 Treatment Prescription 4 - Ecological Fuel Reduction Treatment -- Shaded Fuel Break

Shaded Fuelbreaks are a fuel-reduction technique for forested areas where vegetation is reduced and/or modified to reduce fire hazard in strategic locations on the landscape. Shaded fuelbreaks treat surface, ladder fuels and tree canopy bulk density. This break in fuel continuity is expected to change fire behavior. Fuel reduction activities will create safer and more effective areas for fire-suppression efforts, and contribute to future prescribed fire activities. The proposed treatment would be applied on approximately 1040 acres of mixed conifer stands. Refer to Table A1. Proposed Treatment Prescriptions Acreage by Land Allocations. However, only 145 acres are not within other treatment units. The shaded fuel break is designed to be 500 feet in width covering 250 feet of each side of an associated road or may vary larger on one side or the other depending on slope or ridgetop location.

Where the fuelbreak passes through proposed treatment units, the appropriate unit-specific prescriptions would be applied. Therefore, within the fuelbreak the unit specific treatments would be applied in plantation areas or in naturally forested areas. In addition, prescribed fire may be applied. These treatments would be accomplished through mechanical and hand thinning, piling, and burning.

Where the fuelbreak does not pass though the proposed treatment units, the proposed fuelbreak treatment would be to thinning small diameter trees following Treatment Prescriptions 2. Where chaparral dominates, specifically the north end of the fuelbreak on slopes greater than 35% with high and very high erosion hazards, brush patches of up to 10-15 feet in diameter would be retained to a 30-50 feet spacing between adjacent brush patches.

A5 Treatment Prescription 5 - Ecological Fuel Reduction Treatment -- Chaparral Management

The treatment consists of using prescribed fire as the primary tool for strategic fuel reduction that breaks up the continuity of large chaparral fields without resulting in large-scale changes in habitat type. Prescribed fire use will stimulate chaparral regeneration, contribute to the development of, diversity in seral stages and reducing fuel loading. Prescribed burning will be conducted to minimize impacts to forested areas intermixed within areas dominated by chaparral fields. Protection measures may include activities such as using strategic ignition areas. Strategic ignition may include using tactics such as lightning above a forested area, lighting along a ridgelines, controlling distance between active ignitions, and using natural barriers. Prior to actual burning activities preparation operations may include hand or mechanical thinning of small diameter trees following Treatment Prescriptions 2, brushing of roads, fire line construction and brush removal.

Fire lines construction may be necessary in order to keep prescribed fires contained to unit boundaries, to protect certain features within unit boundaries (e.g. large snags, witness trees, or infrastructure), or to limit the area that is burned in a given day (e.g. for reasons of air quality). Burning would be performed by hand and/or aerial ignition sources. Within the treatment areas, a mosaic of burn severity would be created. In general, this mosaic would be based on existing vegetation conditions.

A5.1 Riparian Reserve Treatments

Refer to **Treatment Prescription 7 Riparian Reserve Management** for specific operations within Riparian Reserve.

A6 Treatment Prescription 6 - Ecological Fuel Reduction Treatment -- Back Fire Area

The treatment consists of using prescribed fire for reducing surface fuel loading, reducing tree density and maintaining fire return interval within the 2008 Back Fire perimeter. Burning would be performed primarily by hand or aerial ignition sources. Thinning small diameters trees following Treatment Prescription 2 may be used to facilitate burning operations. Brushing of roads, line construction and brush removal may be done as preparation for burning. In addition, within areas of heavy surface fuel concentration, piling and pile burning, or jackpot burning may be utilized to facilitate burning operations. The treatment goal is to follow up on the naturally ignited 2008 Back Fire to continue to develop a fire interval that restores and enhances the burned area’s ecological function.

A7 Treatment Prescription 7 - Riparian Reserve Management

Treatments within the identified protective buffers (e.g. Riparian Reserves, SMZs and other sensitive areas) would be undertaken to reduce stand density, enhance stand health, and decrease fuels. Thinning would increase the resiliency of the buffer to natural disturbance regimes, and this type of thinning is consistent with the ACS Objectives (BMP 1.19). The following prescription design features have been developed in response to RX 4 – Minimal Management (LRMP).

A7.1 Treatment Prescription 1, 2, 4, 5, and 6 will follow or Prescription guidelines with the addition of the following:

- Vegetation that is designated for treatment within the SMZ would either be removed in the thinning operation or hand piled for burning (BMPs 1.19, 1.22, 1.6, and 1.8). Not burning hand piles or no treatment within the SMZ is permissible if fuels objectives are still attained.

- Prescribed burning would be conducted within Riparian Reserves and SMZ areas, but active ignition are prohibited within the SMZs. Burning may "back up" into the RRs and SMZs; however, fire would be suppressed if intensity is such that riparian vegetation or overstory canopy mortality would occur.

    - **Exception-** No ignition will be allowed 300 feet of the fish-bearing reaches of Benmore Creek and Bucknell Creek.

- On slopes <40%, no hand pile burning would occur within 25 feet of the channel high water line.

    - ***Exception*** – hand piles may be located within 10-25 feet of the channel high water line if there is a topographic break (flat or bench with slope <20%). During burning, fire would not be allowed to creep outside the perimeter of the piled material, and the downhill perimeter of burn piles would remain unlit in order to retain some slash for ground cover and to function as a sediment trap.

- On slopes 40-60%, no hand pile burning would occur within 25 feet of the high water line, and shall include the following requirements:

    - Piling should utilize topographic features (flats, benches, or areas of least slope (10-20%), where available, to stabilize piles.

    - Slash should be piled with stems oriented with the slope to prevent rollout.

    - **Exception** – hand piles may be located within 10-25 feet of the channel high water line if there is a topographic break (flat or bench with slope <20%). During burning, fire would not be allowed to creep outside the perimeter of the piled material, and the downhill perimeter of burn piles would remain unlit in order to retain some slash for ground cover and to function as a sediment trap.

- On slopes >60%, slash may be lopped and scattered, and within the lower 10 feet of the SMZ the slash is to be moved upslope >10 feet from the channel high water line
-

A7.2 Treatment prescription 3 will follow specific treatment prescription 3 guidelines with the addition of the following:

- Within the outer portion of the riparian reserves, which is from the SMZ out to a total of 150 feet, the thinning prescriptions would be the same as the stand-specific prescriptions. Trees within the riparian reserve will be directionally felled in a manner to prevent impacts to stream banks.

- Within the inner portion of the riparian reserves referred to as the SMZ portion located from the high water line to 50 feet out only trees less than 10 inches DBH would be thinned from below on 15-25 foot spacing, with leave tree spacing dependent upon tree size and crown diameter.

- Retain all riparian obligate (near water dependent) vegetation, including within the RRs of seeps, springs, and unstable areas

- Tractor piling is not permitted within the RRs on slopes >25%; however, mastication or grapple piling is permissible within the RR, but outside of the SMZs on slopes <35%.

- Hand removal (with chainsaws or hand tools) of vegetation within the SMZ is allowed, with location and burning of piles to follow the SMZ guidelines below. Retain 70-75% of existing ground cover (litter/duff) in the SMZ.

- Retain canopy cover consistent with the unit prescription, with a minimum of 50% in intermittent and ephemeral SMZs, and 70% in perennial SMZs.

- On slopes of <50%, retain 70-75% of existing ground cover (litter/duff) in the SMZ, and 60-65% of existing ground cover (litter/duff/rocks) in the remainder of the riparian reserve.

- On slopes >50%, retain 70-75% of existing ground cover (litter/duff/rocks) in the entire riparian reserve.

- Cover bare soil areas that exceed 50 square feet with mulch or slash, at the ground cover level appropriate for the slope class, if the area is likely to deliver sediment to a stream.

Transportation System Management (i.e. roads)

Access to the planning area would be either National Forest system road M1 or County road 301 from the south, or from the west (Potter Valley) again on County road 301. The M1 splits from County road 301 north of the project and just north of the Eel River. The project area has approximately 30 miles of road. Road treatments are proposed on approximately 19 miles of these roads. There areapproximately 10 miles of roads in the action area that will remain undisturbed and will not add to the effects of the roads actively used during project implementation.Most of the NFS roads needed for hauling timber within the planning area were constructed by the late 80's and early 90's when the majority of the forest was logged. Existing system roads needed for the project would require maintenance that could include ditch cleaning, brushing blading, spot rocking, culvert inlet cleaning, culvert repair or replacement prior to thinning. Dust abatement on roads during hauling would be accomplished using water or other abatement materials.

Temporary Roads

Under this alternative, the existing road system plus approximately 0.25 miles of new temporary roads would be used to access commercial treatments. These new temporary roads proposed in this alternative would be located and constructed to minimize ground disturbance, protect resources, and provide safe transportation. There are also roads within this project area that are currently considered temporary as access to them is not allowed and or they have been “put to bed” meaning in general they have been stabilized and have vegetation growing on them. In the past, these temporary roads were constructed for harvest operations. For this alternative, approximately 4.48 miles of temporary road would be reopened and graded to restore the surface prior to use (i.e. reconstruction). SeeAppendix C for expanded view of Alternative 2 map.

Roads to be Decommissioned Following Treatment

Several roads are proposed for decommission (total of 1.14 miles) within the Project Boundary. These include: 18N77, portions of 17N35, unnamed road to Pine Mountain spring, and Unnamed Road off of 18N05. Some of these roads are hydrologically connected and all are considered out-of-use roads. See Appendix C for expanded view of Alternative 2 maps. See Table 1a - 1cfor a comparison of Alternatives.

The proposed decommissioning work may include the following:

- Removal of culverts and associated fill material.
- Stabilizing stream banks at the pulled crossings with native materials (primarily rock) where needed to minimize project generated erosion and channel degradation.
- Removal of unstable road and side cast fill material.
- Place and spread excavated culvert and unstable road fill material in stable locations on adjacent road beds and/or landings.
- Install water bars on treated roads at appropriate spacing based on slope and soil erodibility.
- Subsoil rip road surface entrance where prescribed.
- Jackstraw trees across road entrance.
- Block motorized access on all decommissioned roads.

Alternative 3- No new temporary road construction

Alternative 3was developed to address issues concerning water quality (see “Issues” section, Chapter 1). Alternative 3 would follow actions proposed in Alternative 2, with the exception of no new temporary roads (approximately 0.25 miles). For location of new temporary roads see Appendix C. New temporary roads differ from the proposed temporary roads in that the new roads would have to be newly constructed (i.e. a dozer would have to move soil to flatten and compact the soil, drainage features such as culverts may have to be installed along with gravel placed on top of the road prism). For the proposed temporary roads, a prism already exists, meaning that these road were constructed in the past, but have been stabilized, so that they now have some vegetative cover and in general are not hydrologically connected to any stream (this would be considered reconstruction).See comparison of Alternatives in Table 1. For expanded view of maps for each alterative see Appendix C).

Alternative 4- No commercial thinning in Riparian Reserves

Alternative 4 would follow actions proposed in Alternative 2, with the exception of no commercial thinning in riparian reserves (approximately 686 acres). For location map see Appendix C. Alternative 4 was developed to address issues mentioned in Chapter 1such as an alternative which minimizes adverse impacts to water quality, cumulative watershed effects, and aquatic resources.See comparison of Alternatives in Table 1a - 1c(see Appendix C for maps).

Alternative 5- No commercial thinning in known Northern Spotted Owl nesting habitat

Alternative 5 would follow all the actions proposed in Alternative 2, with the exception of no commercial thinningin NSO nesting habitat, specifically Units 3a, 19, 24b, and 33b.Large trees may be dropped and left in place to provide recruitment of large woody debris. This Alternative was developed to address issues mentioned in Chapter 1 such as concentrating on retaining wildlife habitat connectivity. As you can see in this alternative there are 4 units (3a, 19, 24b, and 33b) approximately 60acres in size, that are proposed as non-commercial, mechanical thinning instead of remaining as it is in Alternative 2, a commercially thinned stand. See comparison of Alternatives in Table 1a - 1c (for expanded view of maps for each alternative see Appendix C).

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for the proposal, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below:

A proposed alternative was suggested to consider a wide range of alternatives, specifically alternatives that:

- Retain all legacy old growth and large old (late successional) fire resistant trees
- Retain habitat wildlife connectivity
- Refrain from any road construction/reconstruction or opening undesignated roads
- Refrain from degradation of any suitable spotted owl habitat
- Retain adequate canopy for old growth related species
- Adhere to ACS Riparian Reserve buffers as stated in the Northwest Forest Plan
- Concentrate on small diameter thinning and
- Decommission unneeded roads.

The suggested elements are incorporated into the proposed action and the integrated design features for alternatives 2 to 5. No additional alternatives are considered at this time.

Anotheralternative suggested was one that would require no more than two entries to meet long term stand characteristics. The project level planning considers the potential effects from proposed action to the environment. At this time, we analyze for effects from all proposed action regardless of the number of entries. The design for the vegetation treatment portion of the project is one single entry, however due to the uncertain of market and weather condition; there is no guarantee for the number of entries. The fuel treatments proposed in the project will require multiple years and entries to be accomplished. Due to the feasibility, we do not limit the number of entries, therefore this alternative is considered but dismissed from detailed study.

The Environmental Protection Agency (EPA) suggested that the DEIS evaluate a range of alternatives, including an alternative which minimizes adverse impacts to water quality, cumulative watershed effects, aquatic resources, and air quality. This is a general suggestion and elements of the suggestion areincorporated into the proposed action and the integrated design features for alternatives 2 to 5.

Wildlife related issues are addressed in the wildlife biological evaluation and biological assessment. The consultation process is also documented with the dialogue between the Forest Service and the Fish and Wildlife Service. Extensive consideration was given to mitigate impacts because the primary objective of the project is the “protection and enhancement” of the wildlife habitat within the LSR, using fuels and vegetation treatment as a tool. The proposed action and alternative5incorporated comments suggested from the public throughout the planning process.

Comments from the public recommended the Forest Service set a maximum diameter limit for tree removal. This alternative was considered but eliminated from a further study based on the following reasons. The Northwest Forest Plan and the Mendocino Forest Plan does not impose a diameter limit.Applying a diameter limit within the planning area managed would not fully achieve the purpose and need for action.The commercial treatment objectives do not focus on a cut tree’s diameter, but to sustain large diameter, older trees that exhibit decadence and defects for use as nest/roost trees and recruit future nest/roost trees by thinning to provide growing space. The objective is to retain the largest trees that express late seral elements and promote healthy black oak and madrone trees wherever possible. The larger diameter trees are generally at or above the average canopy and have the best opportunity to take advantage of onsite resources to maintain or increase growth. The larger diameter trees generally express a higher degree of fire resiliency. Treatments are designed to maintain the existing native species diversity, including hardwoods, within the unit being treated. The treatment will emphasize retaining the following types of trees:

- All pre-dominant conifer trees (larger, older trees left from previous stands that express late seral structural elements such as large branches, cavities and other structures suitable for nesting, denning and resting), and diameters generally greater than 39 inches DBH;
- All dominant conifer trees as required by the LSRA. Tree diameters are generally 30 to 38 inches DBH;
- Codominant and intermediate conifer trees with growing space in the canopy for crown development. These trees express live crown ratios generally greater than 30 percent and diameters generally less than 30 inches;
- Healthy dominant or codominant hardwood trees (particularly black oak and Pacific madrone).

First priority for removal would be the smaller trees generally 20 inches DBH or less. These trees were established as a result of past harvest activities, or other disturbances. They are usually present below the average canopy and are impacting the larger diameter trees as a result of competition for light, water, and nutrients. Some codominant trees would also be removed to increase growth of adjacent trees and to meet the desired residual stand density. Generally, the following types of trees would be removed from the stand:

- Suppressed conifers (diameters generally less than 14 inches);
- Intermediate conifers without growing space in the canopy for crown development (diameters generally less than 20 inches);
- Codominant conifers that do not have growing space in the canopy for further crown development (diameters generally less than 24 inches), or
- Codominant trees needed to reduce stand density to desired levels; and
- Codominant, intermediate, and suppressed conifers adjacent to pre-dominant conifers, or dominant / codominant hardwoods, to enhance survival of theses leave trees.

Commercial thinning will focus on removal of lower story, smaller diameter trees, suppressed and intermediate trees developing a stand that is of appropriate density to maintain the stand in a reasonably vigorous and healthy condition to extend the retention of the large, old trees and other attributes of suitable habitat for as long as possible (see Silviculture Report, USDA 2017b)

Monitoring Requirements

Monitoring is an important step in the management process to determine if the Forest's management strategy has been appropriately implemented and is effective in achieving the identified goals.

Project level and LRMP monitoring is implemented in accordance with the Land and Resource Management Planning Handbook [FSH 1909.12, Chap. 6, WO Amendment I, 7/88]. It is limited to those actions necessary to comply with the regulations set forth by the National Environmental Policy Act (NEPA) and the National Forest Management Act (NFMA). Resource-specific monitoring is additional monitoring that is required by other laws, executive orders or supplemental plans (such as the Threatened and Endangered Species Plans).

There are several required and resource specific monitoring that occur annually on the Forest, such as invasive species monitoring, best management practices monitoring and instream monitoring. Also, post-harvest inspection monitoring is usually done during project implementation or soon after the project is finished in order to validate that silviculture prescriptions have been implemented.

Design Criteria common to All Action Alternatives

The Forest Service also developed design criteria to be used for all action alternatives. The project design criteria are incorporated into the project activities and are intended to reduce, minimize, or eliminate impacts to various natural and human resources. These features are intended to assure project compliance with the resource protection standards and guidelines of the Mendocino National Forest LRMP, as well as compliance with other Federal and California State laws, regulations, and policy (See Appendix D, Consistency Checklist).

Comparison of Alternatives

This table provides a brief summary of the alternatives and their environmental impacts in comparative format.

Table 1a. Comparison of Alternatives

Table1a INDICATORS	Alternative 1 No Action	Alternative 2 (Commercial*)	Alternative 3 No New Temporary Road Construction	Alternative 4 (No Commercial*) Riparian Reserves	Alternative 5 (No Commercial*) Nesting Units
Number of Acres Meeting USF&W Nesting Habitat Indicators	20	331	331	444	331
Number of Acres Meeting USF&W Foraging Habitat Indicators	753	1192	1192	1079	1192
Number of Acres Not Meeting USF&W Habitat Indicators	824	74	74	74	74
Number of Unit Acres where Stand Density Index = Extreme High Density.	1680	20	20	20	29
Number of Unit Acres where Stand Density Index = High Density.	21	229	229	1335	220
Number of Unit Acres where Stand Density Index = Moderate Density.	0	1452	1452	346	1452
Number of Acres Mid Successional Stage	1014	17	17	17	17
Number of Acres Late Successional Stage	666	1663	1663	1663	1663
Acres of mixed conifer stands with stocking levels reduced to a healthier	0	1700	1700	1000	1640

Table1a INDICATORS	Alternative 1 No Action	Alternative 2 (Commercial*)	Alternative 3 No New Temporary Road Construction	Alternative 4 (No Commercial*) Riparian Reserves	Alternative 5 (No Commercial*) Nesting Units
more resilient density.					
Acres of RRs treated to increase resilience to disturbance	0	700	700	0	700
Fire Activity Type measured as percentage of areas expected to have surface fires.	18%	92%	92%	73%	89%

*Calculated based on treatment 3 (commercial treatment i.e. restoration by-product) only.

Table 1b -

Table 1b **INDICATORS**		Alternative 1 No Action	Alternative 2 Treatment	Alternative 3 No New Temporary Road Construction	Alternative 4 (No Commercial) Riparian Reserves	Alternative 5 (No Commercial) Nesting Units
Acres of LSR treated to protect late successional habitat and enhance habitat.		0	5900	5900	5900	5900
Miles of road decommissioned to meet ACS objectives		0	1.14	1.14	1.14	1.14
Miles of new temporary road constructed and decommissioned after use		0	0.25	0	0.25	0.25
Acres of chaparral burned to increase the proportion of younger chaparral seral stages		0	600	600	600	600
Flame Length/Fire Intensity measured	Moderate	1%	1%	1%	3%	1%
	High	1%	0%	0%	1%	0%

Table 1b **INDICATORS**		**Alternative 1 No Action**	**Alternative 2 Treatment**	**Alternative 3 No New Temporary Road Construction**	**Alternative 4 (No Commercial) Riparian Reserves**	**Alternative 5 (No Commercial) Nesting Units**
as percent of area expected to be less than 4 feet	**Very High**	77%	7%	7%	17%	8%
Miles of shaded fuel break constructed or improved		0	9	9	9	9
Plantation acres treated to reduce competition		0	364	364	364	364
Compliance with Forest Plan management direction, as documented in Appendix B		No	Yes	Yes	Yes	Yes
Compliance with other applicable requirements, as documented in Chapter 3 – Environmental Consequences.		N/A	Yes	Yes	Yes	Yes

Table 1c. Determinations

Table1c **Determinations**	**Alternative 1 No Action**	**Alternative 2 (Commercial*)**	**Alternative 3 No New Temporary Road Construction**	**Alternative 4 (No Commercial*) Riparian Reserves**	**Alternative 5 (No Commercial*) Nesting Units**
Northern Spotted Owl	No Effect	MANLAA	MANLAA	MANLAA	MANLAA
Northern Spotted Owl Critical Habitat	No Effect	MANLAA	MANLAA	MANLAA	MANLAA

Table1c Determinations	Alternative 1 No Action	Alternative 2 (Commercial*)	Alternative 3 No New Temporary Road Construction	Alternative 4 (No Commercial*) Riparian Reserves	Alternative 5 (No Commercial*) Nesting Units
Anadromous Fish	No Effect	MANLAA	MANLAA	MANLAA	MANLAA
Anadromous Fish Critical Habitat	No Effect	MANLAA (coho)/ No Effect (chinook and steelhead)	MANLAA (coho)/ No Effect (chinook and steelhead)	MANLAA (coho)/ No Effect (chinook and steelhead)	MANLAA (coho)/ No Effect (chinook and steelhead)
Other					
Watershed Cumulative Effects	No Change	Below Theshold	Below Theshold	Below Theshold	Below Theshold
Present Net Value (PNV) of Timber Harvest and all other planned activities	0	-$1,476,785.21	-$1,478,526.52	-$1,676,794.46	-$1,407,622.48

*Commercial treatment i.e. restoration by product.

Chapter 3. Affected Environment and Environmental Consequences

This chapter summarizes the physical, biological, social, and economic environments of the planning area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. Analyses are derived from more detailed resource specialist reports that are located in the project record in the Upper Lake Ranger District Office and can be found:https://www.fs.usda.gov/project/?project=13615.

About Cumulative Effects Analysis

According to the Council on Environmental Quality (CEQ) NEPA regulations, “cumulative impact” is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7). Relevant actions are those expected to generate effects on a resource that would occur at the same time and in the same place as effects from the proposed action or alternatives.

To understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, the analyses found throughout this document relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify every action over the last century that has contributed to current conditions.

Additionally, focusing on the impacts of past human actions risks, and ignoring the important residual effects of past natural events, may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Finally, the Council on Environmental Quality (CEQ) issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.” For these reasons, the analysis of past actions within the various resource sections is primarily based on current environmental conditions.

The cumulative effects analysis in this DEIS is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008), which state, in part:

> CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives would add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making (40 CFR 1508.7).

Past, Present, and Reasonably Foreseeable Actions Relevant to Cumulative Effects Analysis

Cumulative effects will be discussed within the individual resource sections later in this chapter, whenever applicable. This section is in support of each individual section where cumulative effects are discussed. The source of information for past federal actions and activities is located within the Forest Service Activity Tracking System (FACTS) database. The temporal boundary is 20 years (1995-2015) and the spatial boundary is within the 7^{th} field watershed.Table 2 summarizes individual activities that have occurred within the 7th field watersheds that fall within the project boundary on Forest Service lands since 1995. Spatial boundary for CEA of each resource may vary depending on effects to resources.

Grazing is not shown in the table. The entire Pine Mountain project area falls within the Pine Mountain and York Cabin grazing allotment. There are currently 98 cattle grazing these allotments and they generally graze from May 16 to September 30.

All recorded activities are displayed on the map below (Figure 77). There are two general categories of activities: vegetation treatment (logging, site preparation, and tree planting) and fuels treatment (past burning and fuels work). Past activities are considered and incorporated into the environmental analysis, as they contributed to the existing condition.

Table 2. Past Activities Summary (1995-2015) from FACTS Database

Activity	Date	On map
Broadcast Burning - Covers a majority of the unit	2002-2005	burning
Burning of Piled Material	2005-2013	burning
Certification of Natural Regeneration with Site Prep	1995	site prep
Certification of Natural Regeneration without Site Prep	2011	N/A
Certification-Planted	1995-1996	tree planting
Chipping of Fuels	2004-2010	fuels work
Commercial Thin	2005-2008	logging
Fertilization	1995-1997	N/A
Fill-in or Replant Trees	1996 and 2006	tree planting
Invasive - Mechanical /Physical	2009	N/A
Invasive - Pesticide Application	2005	N/A
Overstory Removal Cut (from advanced regeneration) (EA/RH/FH)	1997	logging
Piling of Fuels, Hand or Machine	2004-2012	fuels work
Plant Trees	1996,2004,2006,2010-2012	tree planting
Plantation Survival Survey	2004-2011	N/A
Post Treatment Vegetation Monitoring	1995	N/A
Precommercial Thin	1995-2012	fuels work
Rearrangement of Fuels	2003, 2008 and 2011	fuels work

Activity	Date	On map
Reforestation Need Created by Fire	2008	tree planting
Silvicultural Stand Examination	2005	N/A
Site Preparation for Planting - Burning	2009	site prep
Site Preparation for Planting - Mechanical	2003 and 2008	site prep
Stand Silviculture Prescription	1996 and 2004	N/A
Stocking Survey	1995-2008	N/A
Thinning for Hazardous Fuels Reduction	2004-2012	fuels work
Tree Release and Weed	1995-2001	fuels work
TSI Need	1995-2008	N/A
Underburn - Low Intensity (Majority of Unit)	2002-2013	fuels work
Wildfire - Fuels Benefit	2008	N/A
Yarding - Removal of Fuels by Carrying or Dragging	2005 and 2007	logging

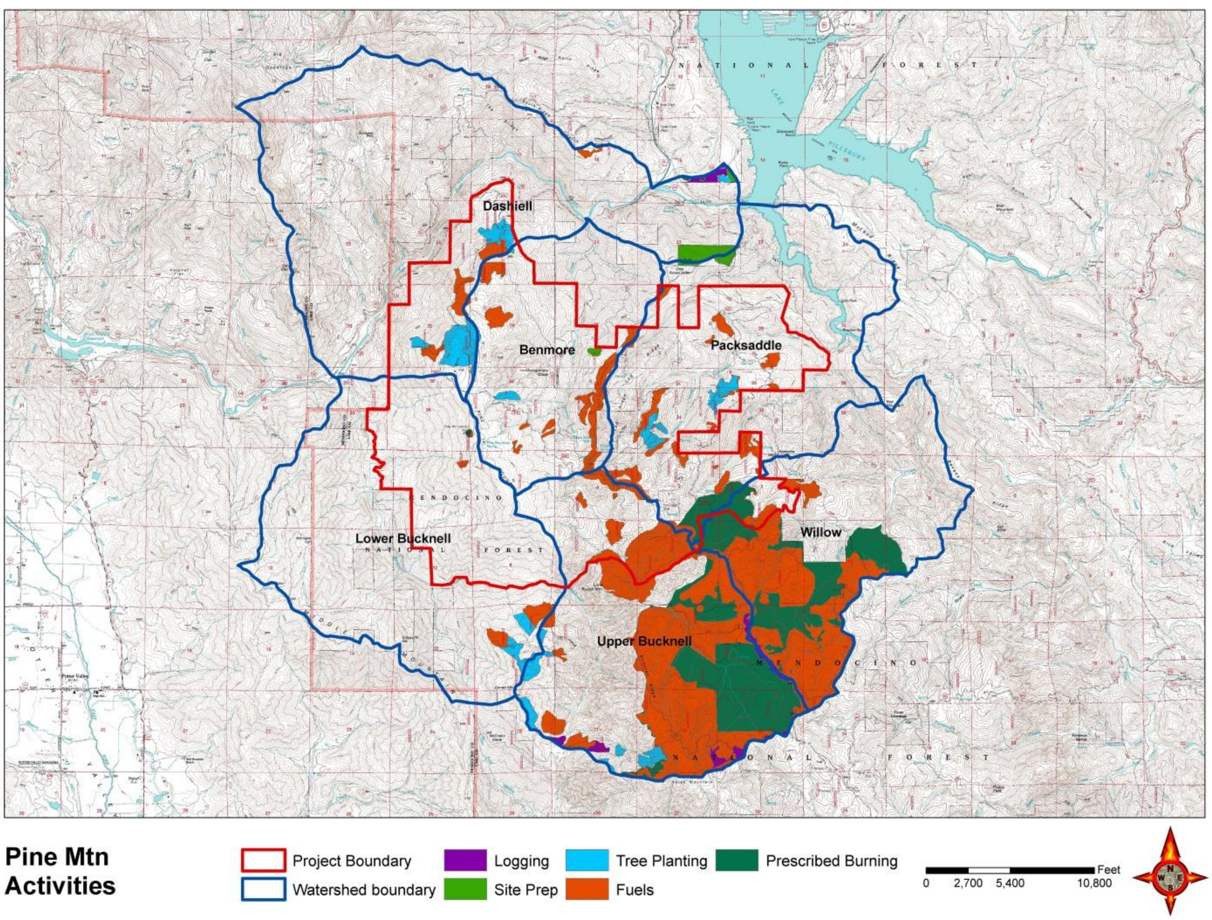


Figure 7. Known past, present and future activities within 7th field watershed.

Current and Reasonably Foreseeable Future Actions

The following projects are described as current and reasonably foreseeable future actions that may be considered in addition to the proposed project for analysis. Some ongoing actions are within the Pine Mountain project area; this list includes actions within the Dashiell, Packsaddle, Benmore, Willow, Upper Bucknell and Lower Bucknell 7th field watersheds.

The list also includes some actions immediately adjacent to these watersheds that may affect the environment of the project area.

Howard Mill Project *(planning complete, implementation ongoing)* is located within the Upper Bucknell Creek, Packsaddle, Willow, Bevans, Parramore, Sled Ridge, Grizzly Canyon and Panther Canyon 7th field watersheds. The project encompasses about 7,400 acres. The main purpose of this project is to reduce hazardous fuel loading and competing vegetation in the mixed conifer plantations that were planted following the Round Fire in 1966. Approximately 4,900 acres have been understory burned since project implementation began.

Pine Mtn Lookout Project*(planning complete, implementation ongoing)* is located within the Lower Bucknell Creek 7th field watershed. The project encompasses about 26 acres, and includes hazardous fuels thinning <8" DBH and pile and understory burning.The main purpose of this project is to reduce hazardous fuel loading and to lessen the risk of fire,thereby protecting the historic lookout. Thinning was completed in 2007.

Elk Mountain Fuelbreak *(planning complete, implementation ongoing)* is located between the Middle Creek Campground and the Rice Fork turn off at Lake Pillsbury along Elk Mountain Rd (M-1). The project is about 700 acres, and includes hazardous fuels thinning <10" DBH and understory burning. The primary purpose of this project is to maintain a shaded fuelbreak along Elk Mountain Rd, serving as a strategic control point in an area historically known for large wildfires.

Westshore Project*(planning complete, implementation ongoing)* is located within the Welch, Mill, Boardman, and Dashiell 7th field watersheds. The project consists of 13 units and encompasses about 1,069 acres. The project includes hazardous fuels thinning <10" DBH, timber harvest, and pile and understory burning.The primary purpose of this project is to reduce hazardous fuels in the wildland-urban interface in the Lake Pillsbury Area. Timber Harvest was completed in 2013.

Streeter Ridge Project*(planning complete, implementation ongoing)* is located within the Upper Bucknell Creek 7th field watershed. The project encompasses about 262 acres, and includes hazardous fuels thinning <10" DBH and pile and understory burning.The main purpose of this project is to reduce hazardous fuel loading and competing vegetation in the mixed conifer plantations that were planted following the Round Fire in 1966. Thinning was completed in 2010.

Willow Creek Project*(planning complete, implementation ongoing)* is located within the Willow, Parramore, and Bevans 7th field watersheds. The project encompasses about 335 acres, and includes hazardous fuels thinning <10" DBH and pile and understory burning. The main purpose of this project is to reduce hazardous fuel loading and competing vegetation in the mixed conifer plantations that were planted following the Round Fire in 1966. The majority of the thinning was completed in 2011 and 2013.

High Horse Project *(planning complete, implementation ongoing)* is located within the Upper Bucknell, Parramore, Grizzly Canyon and Panther Canyon 7th field watersheds. The project encompasses about 545 acres in the Horse Mountain area, and includes hazardous fuels thinning <10” DBH, timber harvest, and pile and understory burning.The main purpose of this project is to reduce hazardous fuel loading and competing vegetation in the mixed conifer plantations that were planted following the Round Fire in 1966. Timber Harvest was completed in 2007.

There are no known additional future federal actions, other than the proposed actions and alternatives described in the Pine Mountain project (Chapter 2 and Appendix A).

There are no known timber harvesting activities within private inholdings adjacent to the project area within the 7th field watershed. This conclusion was drawn from the California Department of Forestry and Fire Protection website inventory of approved timber harvest plans (THP) from October 2015. (http://www.calfire.ca.gov/ResourceManagement/THPStatusUpload/THPStatusTable.html)

Vegetation

Sources of Information for Analysis

Common Stand Examination (CSE) data measured during the period 2008-2011 were focused on units proposed for a commercial treatment. The inventories are intended to provide information on the conditions of the various seral stages across the landscape, as well as some unit-specific information. The units that are proposed only for understory fuel reduction treatments (underburning and/or sub-merchantable brush and tree removal only) were not inventoried and effects are based upon professional local experience with treatments in similar conditions.
Site visits have occurred from 2008 through 2016 to validate inventory data and vegetative conditions. Site visits have included representatives of the U.S. Fish and Wildlife Service and the National Fisheries Marine Service (of the National Oceanic and Atmospheric Administration [NOAA]) and interested members of the public. Site visits were conducted by Forest Service and consulting experts in the following areas: forestry, fire and fuels management, fisheries, forest pest management, hydrology, recreation, scenic management, silviculture and wildlife and fisheries.

Analysis Methods

This analysis is based on the project area and treatment unit areas available existing data; data collected specific to the project area treatment units; research material and literature; forest wide assessments, field reviews and information received from public scoping.
To describe the project area, vegetation characteristics and current conditions have been determined using information obtained from the watershed reports for the Upper Main Eel River Watershed and Upper Lake Watershed. Vegetation attributes such as vegetation cover type, seral stage, and NSO habitat type were developed through office evaluation followed up by field review to verify site conditions.

More detailed data has also been collected at the proposed treatment unit scale. Individual stand inventory data provided information regarding current treatment unit conditions. These new stand exams for the selected commercial treatment units, were accomplished using the Common Stand Examination inventory protocol field surveys. They were accomplished in 2008 and 2011. Stand characteristics such as species, trees per acre, seral stage, and NSO habitat type were then analyzed to refine potential treatment areas.

Other data sources for analysis of existing vegetation conditions were from the Forest Service Activity Tracking System (FACTS), Forest Inventory and Analysis (FIA), Remote Sensing Lab (RSL) Existing Vegetation – GIS layer database (USDA 2011a), aerial photography dating from 1940s through 2010, NAIP Air Photo imagery 2009-2010, and the Mendocino National Forest GIS database Library.
The Forest Vegetation Simulator (FVS) program (Dixon 2002) was used to assist in modeling and predicting the effects of treatments on Cover Types and structure (size class, densities and

canopy layers), tree growth, stocking, and canopy fuels. FVS provides probable outcomes to compare alternatives and fine tune silvicultural treatment prescriptions. FVS modeling is an approximation of actual conditions. The modeling does not replicate exactly the existing conditions or conditions that would occur after treatments. For this analysis, FVS was used to generally characterize and display existing conditions and to approximate the nature and magnitude of treatment effects to support NEPA decision process.

Treatment prescriptions were based on the existing vegetation compared to desired stand conditions. Treatment prescriptions were then assigned to the proposed treatment areas based on topography, slope, and access.

Post-treatment modeling, using FVS Inland Klamath Mountains (NC) variant supplied the post-treatment conditions for the representative seral stages and NSO habitat vegetation structure.
The FlamMap software program was used to analyze fire effects. Fire effects were measured as percent of area expected to have a crown fire under 97th percentile weather condition. FlamMap models expected fire types (Surface fire or Canopy fire) and flame length corresponding to fire type.

Project analysis shall develop stand basal area (BA), percent stand density index (SDI%), total trees per acre (TPA), quadratic mean diameter (QMD), number of trees per acre $\geq$26" DBH, percent canopy cover, flame length and potential fire type. These measures shall be used to describe the treatments, their effects, and comparisons with historic, desired, and existing conditions.

Affected Environment of the Vegetation Analysis

For the purposes of the vegetation analysis, the analysis area consisted of the Pine Mountain planning area. The project area is the area covered by treatment units, and varies by alternative.

Existing Condition

<u>Existing Vegetation Types</u>

The Pine Mountain Project area contains a variety of vegetation types. The California Wildlife Habitat Relationship system identified fourteen different vegetation types. These types are present in varying concentration from pure chaparral stands to a combination of chaparral – hardwood, conifer – hardwood, or mixed conifer associations. See Silviculture Report (USDA 2017b) for tables and figures.

OVERVIEW

The Pine Mountain Late-Successional Reserve Habitat Protection and Enhancement Project (Pine Mountain Project) is situated in the southwest portion of the Upper Lake Ranger District, Mendocino National Forest, southwest of Lake Pillsbury. The project emphasizes fuel reduction activities and habitat management for the protection and enhancement of late-successional species. The project area was chosen for treatment based on location and past fire and timber harvest history that have contributed to the development of the existing conditions that pose a threat to late-successional habitat.

The project area is located within the southern portion *mid montane ecological zone* of the Klamath bioregion*,* an area of diverse conifer and woodland species. Historic vegetation community dynamics within the mid- to upper-montane zone are believed to have been influenced by a fire regime characterized by fairly frequent low and mixed severity fires that created an open understory mixed conifer forest habitat across the project landscape. (Skinner et al. 2006) Historically fires have thinned out competing species, recycled nutrients into the soil, released and scarified seeds, and opens holes in the forest canopy for sunlight to enter. All of these are critical to forest health and natural cycles of growth and decomposition. Plant communities and ecosystems have evolved with and adapted to fire. This historic dynamic provided an ample supply of high quality habitat for many species including species that require late-successional habitat. Changes in vegetation dynamics caused by the alteration of the historic fire regime have caused a shift in tree density distribution and quality of habitat. The current existing condition tree density is impacting and lessoning late successional habitat quality including Northern Spotted Owl nesting and foraging as the number of large diameter trees has decreased in relationship to increasing number of small diameter trees.

The Projects existing vegetative condition is a result of combination of factors. These factors include Historic Vegetation Conditions, Historical Pre-Suppression Era Fires, Fire Suppression, Suppression Era Fires, Forest Health, Timber Harvest Activities, Weather Events and Climate Influence. The Pine Mountain Project area, like many locations throughout the Mendocino National Forest, is especially vulnerable to wildfire because it has lost much of the historic fire resilience due to overcrowding caused by fire suppression and only minimal management activities employed to control regeneration response, which began in the early 1940's and continued into the early 2000's timber harvest time period.

The result is an existing condition characterized by increased tree densities contributing to ladder fuel connectivity to the upper canopy levels; shading out large hardwood trees and small area hardwood patches, as well as large and small diameter ponderosa pine trees. The overall effect impacts species diversity, contributes to a substantial increase in surface fuel loading and ladder fuel connectivity compared to historic conditions. In addition, when the large diameter pine trees fall out as individual or in clump concentrations, they take out some of the ladder fuel trees. The result is creating heavy surface fuel concentrations around the downed larger pine trees. As a result, the potential for the project area to burn at high severity (where most mature trees are killed) has increased dramatically. The crucial interaction is that wildfires under these conditions are larger; as well as, more intense, erratic and difficult to control. Firefighter safety, ecosystem sustainability and late-successional species populations are all compromised by these conditions which tend to produce uncharacteristic wildfire events.

Historic Vegetation Conditions

The Reference Community for the Pine Mountain Project site is the plant community that existed at the time of European immigration and settlement. It is the plant community that was best adapted to the unique combination of environmental factors associated with the site. This community was in dynamic equilibrium with its environment. It is the plant community that was able to avoid displacement by the suite of disturbances and disturbance patterns that naturally occurred within the area occupied. Natural disturbances, such as drought, fire, animal and insect impacts, were inherent in the development and maintenance of these plant communities. The effects of these disturbances are part of the range of characteristics of the site that contribute to that dynamic equilibrium. Fluctuations in plant community structure and function caused by the effects of these natural disturbances establish the boundaries of dynamic equilibrium. They are accounted for as part of the range of characteristics for an Ecological Site. Plant communities that are subjected to abnormal disturbances; physical site deterioration; or protection from natural influences for long periods, such as fire exclusion, seldom typify the historic Reference Community. Such communities may exist in a steady state that is very different from the historic Reference Community.

The historic vegetative conditions within the Pine Mountain Planning Area consisted of relatively open forested stands of predominately large, Douglas-fir, ponderosa and sugar pine and hardwoods. Field data and observations indicate these trees varied in distribution from widely spaced individuals or multiple trees arranged in a clump like distribution that contributed to an overall open canopy (40 to 60%) stand structure on the flatter ridge top or upper slope areas to closely space tree distribution on the lower slopes to near watercourse areas.

Historical Pre-Suppression Era Fires

Before Euro-American settlement, relatively frequent fires strongly influenced the composition, structure, and dynamics of the Pine Mountain Project forest ecosystems (Ferrell 1996; Skinner and Chang 1996). These fires, mostly low to moderate in severity, caused changes by damaging or killing plants and setting the stage for regeneration and vegetation succession. They maintained surface fuels at fairly low levels, and in most areas kept forest understories relatively free of small diameter trees (i.e. ladder fuel). In addition, fires influenced many processes in the soil and forest floor, including the organisms therein, by consuming organic matter, affecting nutrient cycling, and inducing other thermal and chemical changes (Agee 1993; Chang 1996). These fire effects in turn resulted in a wide array of effects on other ecosystem components and processes, including wildlife communities and watershed properties. Because fire influenced the dynamics of nearly all ecological processes, reduction of the fire influence through the 20th century and into the 21st century, fire suppression efforts has had widespread ecosystem effects.

The dramatic reduction in area burned has led to substantial increases in the quantity and changes in arrangement of live and dead fuels. While data from early 20th century is not available for the Pine Mountain Project, the Late Successional Reserve Assessment does provide information based on comparisons with early conditions characteristics of conifer stands within the Thomes Creek watershed pre-fire suppression (1913) vs. post-fire suppression (1991) (USDA 2000, pgs. 14-15). Refer to Table 4 below.

Table 3: Average Conifer Stand Conditions, 1913 vs. 1991.

Average Stand Characteristics	**1913**	**1991**
Number of trees/acre	20	106
Conifer diameter (inches)	28	16
Conifer basal area (sq. ft/ac)	89	141
Stand age (years)	300 (estimated)	182
Relative stand density (% normal basal area)	31	62
Annual mortality (per 10,000 conifers)	4 (0.04%)	52 (0.52%)

Conditions similar to Table 3have been discussed in the literature as well, and have been inferred from numerous historical accounts, documented fire histories, and structures of uncut stands (Kilgore and Sando 1975; Parsons and DeBenedetti 1979; Bonnickson and Stone 1982; van Wagtendonk 1985; Biswell 1989; Weatherspoon and others 1992; Chang 1996; Skinner and Chang 1996; Weatherspoon and Skinner 1996).

The shift away from the historic reference community has increased the project susceptibility to uncharacteristic fire effects (Allen et al., 2002; Agee and Skinner, 2005; Peterson et al., 2005; Noss et al., 2006). The reference community forests embodied structural and compositional conditions resistant and resilient to fire (Fule, 2008; Stephens et al., 2008). The reference community forest persisted through numerous past disturbance events and through multiple centuries of climatic fluctuation (Agee, 1993; Allen et al., 2002).

Fire Suppression

The probability of severe fire disturbance today is much higher than under historic vegetative conditions. To evaluate the current conditions of lands in relation to their historic or “natural” reference condition, an interagency standardized assessment method, Fire Regime Condition Class (FRCC), was developed to describe the degree to which vegetation condition and structure, fire frequency and severity depart from natural or historical ecological reference conditions (Hann et al. 2005). Historically the Pine Mountain Project fire regimes were within a range where the risk of losing key ecosystem components was low. Vegetation attributes (species composition and structure) were intact and functioning within the historical range. The Pine Mountain Project Planning Area would be classified as a Fire Regime Group 1, defined as *"a fire of a low severity burning in the area every 0-35 years"* (Rice 2006). A study conducted in the early 1990s in the Upper Main Eel watershed (USDA 2000, pg 12) concluded the natural fire return interval was 10-21 years, with ground fires of low-intensity, having flame lengths of less than four feet. They were often followed by a pulse of conifer regeneration under the existing stand, and density controlled by the repeated short term fire interval. However, early in the twentieth century fire suppression began to change the fire regime. Effective suppression efforts have virtually eliminated fire as a factor shaping vegetation within the Pine Mountain Planning Area in the last 80-100 years, and greatly altered the natural fire return interval, which is currently estimated to range between 43-57 years. Currently forested stands within the Pine Mountain Planning Area would be largely classified as a Condition Class 3, the most extreme departure from the historic fire regime. Fire frequencies have departed from historical frequencies by multiple return intervals. The results is a dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range, and the risk of losing key ecosystem components is high. Fire suppression efforts have changed the fire regimes from fire-maintained regimes to fire-initiated regimes (i.e. Wildfires that destroy a substantial amount of the forest vegetation).

Active fire suppression has developed a vegetation mix very different today than it was when fires burned frequently. Fire suppression effects on vegetation characteristics has been to substantially increase both live and dead fuel loading. Effects on forested landscape characteristics has been to substantially increase timber stand density and alter timber stand structure. Effects are expressed in tree density and structural characteristics that increase ladder fuel connectivity and uncharacteristic latter fuel density. In addition, fire suppression has develop excessive to extreme ground fuel concentrations and abnormal canopy bulk density. High fuel loading in terms of ladder fuels and ground fuels produce higher intensity wildfires. Higher intensity wildfires increase larger diameter tree mortality rates or the occurrence of uncharacteristic wildfire events.

Prior to fire suppression, low intensity wildfire kept ground fuels, small conifers, and hardwood and brush sprouts to levels that posed only a minor hazard to fire intensity. When fires did not occur and kill the resulting regeneration, the trees continued to grow. The continued growth developed forest stands that are multi-aged. Commonly there are two to three age classes represented. The smaller trees in the stand are often not younger; they are simply suppressed trees that were not competitive with the rest of their cohorts of the same age.

Another effect attributed to the conifer regeneration is conifer intrusion into large diameter hardwood tree canopies or conifers overtopping hardwood trees. The effect is the shading out individual trees or small hardwood patches. If the oaks are suppressed by conifer competition for a long enough time, both the tops and root burls will die. The long-term survival of oaks as a natural component of the mixed conifer forest type depends upon their maintaining vigorous root (burl) structure, which allows for rapid sprout regeneration following a wildfire or other disturbance event. Enabling hardwoods to have a significant competitive regeneration advantage over conifer seedlings. (USDA 2000, pgs. 18-19).

Suppression Era Fires

The Pine Mountain Planning Area has only experienced minor fire activity during the fire suppression era. However, the area surrounding the Pine Mountain Project has been subjected to large moderate, and high intensity stand replacing fires. Refer to the Fire and Fuels Specialist Report (USDA 2016c) for detailed information. The increase vegetation density attributed to fire suppression effects have rendered the stands more vulnerable to uncharacteristic wildfire.

Timber Harvest Activities

Pine Mountain Project timbered stands had past management activities. Past timber harvest operations associated with this area were conducted in a manner that focused on high yield timber sales. Timber harvest operations ranged from partial removal of large diameter trees followed by natural regeneration; to later clear cutting operations followed by the establishment tree plantations. The effects of these timber operations combined with fire suppression activities essentially enabled development within partially harvested areas of a dense understory small tree component that is expressed as an abnormal ladder fuel density and fragmented late-successional old growth stands. Sustaining the pre-harvest ecosystem was not a driving force. Aerial photo analysis, FACTS database query and on the ground reconnaissance concluded that partial harvest of large overstory trees began in the period 1942-1952, and continued up until 1988- 2001. Refer to Table 6 Harvest History in the Silviculture Report (USDA 2017b). Aerial photo Figure 1 circa 1942 and Figure 2 circa 1952 show little to no ground disturbance (see Silviculture Report, USDA 2017b, for figures and tables). Figure 3 a photo discovered in the MNF archives pictures a log truck being loaded on Forest Service road 17N23 dated 1954. Aerial Photos Figure 4 circa 1961 and Figure 5 circa 1969 indicate timber harvesting progression. Harvest operations covered an extensive area which opened up the stands. The extensive ground disturbance provided opportunities for natural regeneration to occur. The 1980's began a period where clear-cut harvest operations resulting in establishment of approximately 700 acres of plantations. Refer to Figure 6 Pine Mountain Project 1988 Aerial Photo (see Silviculture Report, USDA 2017b, for Figures and Tables). Most of these plantations need treatment in order to prevent competition-induced mortality and to increase diameter and height growth, thereby shortening the time period of extreme fire susceptibility, density related insect mortality and accelerating their development into late-successional stands.

Post-harvest forest development has established forest stands that have differing degrees of structural variation. . The effects of these timber operations combined with fire suppression activities essentially enabled the development of dense even-aged marginally differentiated timber stands. Forest stand structure also includes single storied early successional tree plantation stands, two storied stands, two storied stands with an occasional remnant old growth component and three storied stands. Single story plantation stands consist of 15-40 year old planted trees with varied degrees of planted and natural species diversity. Table 4 depicts some average values for attributes of these three layers.

Table 4: Average Attributes of Layers (Note: there is considerable variation around the averages)

Layer	Age	Diameter (in.)	Height (ft.)	Trees/acre
Layer 1	30-80	<10	10-60	500-1000+
Layer 2	80-120	10-30	90-150	80-120
Layer 3	200+	>30	170-210	0-20

Forest health

Forest health is a measure of a forest overall capacity to maintain biological diversity, normal productivity, sustainability, and resilience to disturbance.

Project area field examination indicates that forested stands are densely stocked resulting in a high level of inter-tree competition. Contributing to a loss of stand vigor leading to increasing susceptibility to forest pests, especially during prolonged periods of low precipitation. Existing conditions are trending to a reduction in biological diversity, developing higher fuel loads, and increasing fire danger impacting stand resilience to disturbance and sustainability. The increased density has led to a downward trend in the presence, establishment and health of sugar pine, ponderosa pine and black oak trees.

Insect and Disease

Western Bark Beetle: The western pine beetle (*Dendroctonus brevicomis*) is the most devastating insect affecting ponderosa pine in California. Normally, this beetle breeds in windfalls, unhealthy trees, or in trees weakened by drought, stand stagnation, fires, and other beetle infestations, which usually leads to tree mortality (Keen 1952).

Forest ecosystem health is affected by the high tree densities across the project area creating a situation conducive to increasing insect population. Insects and diseases at endemic levels create dead and down material and recycle nutrients into the ecosystem. However, they can also act as major disturbance agents with the potential to substantially change species composition. During this past decade the project area's mixed conifer stands influence by prolonged periods of low precipitation experienced an insect related die off of large diameter ponderosa pine trees. Mortality was especially severe in pines with a high density of Douglas-fir trees in close proximity. The affect was developed due to a high level of moisture stress related inter-tree competition. The result was a loss of pine tree vigor, eventual insect attach and tree mortality.Mortality is found as individual tree or seen in pockets ranging in size from 3-5 trees to as many as 15 or more trees. The result is creating heavy surface fuel concentrations around the downed larger pine trees. Contributing to a substantial increase in the potential for the project area to burn at high severity (where most mature trees are killed). The above described moisture stress situation has potential to impact plantations. Pine plantations tree density is creating an at risk situation for beetle attack. Management actions now have potential to prevent major beetle impacts.

Mountain Pine Bark Beetle: The mountain pine beetle (*Dendroctonus ponderosae*) has been observed attaching sugar pines in the Back fire location of the Pine Mountain Project area.

White Pine Blister Rust: White pine blister (Cronartium ribicola) rust is present in the Pine Mountain Project area. This introduced disease is associated with sugar pine the only white pine present. The disease is introduced by spores from the alternate host (gooseberry), usually on limb tips, and moves through the tree tissue toward the main trunk. In many cases, young trees are killed and older trees have tops or branches killed, but they also can be killed. This disease can reduce tree vigor to a point where other factors, including mountain pine beetle, can kill host trees. Blister rust was observed in minor amounts in field reviewed stands.

Dwarf Mistletoe: Dwarf mistletoe (*Arceuthobium* spp.) is an endemic disease found throughout the Pine Mountain Project area. Dwarf mistletoe is a host-specific (capable of living solely on or in one species) parasitic seed plant. Field reconnaissance identified mistletoe infection. Conifer species most affected are Douglas-fir and ponderosa pine indicating that different dwarf mistletoe species are present.

Mistletoe severity is usually described by a relative index for the amount of host crown affected (Hawksworth et al. 2002). The six-class dwarf mistletoe rating (DMR) system developed by Hawksworth (in 1977) is a commonly used mistletoe infection rating method. Approximately 50 percent of the trees that are severely infected (DMR 6) will die within the next decade (Hawksworth and Geils 1990). Tree growth particularly in pines begins to slow noticeably when

DMR 3 is reached. In Douglas-fir, height growth and tree vigor may be reduced, but at low DMRs, tree effects are difficult to demonstrate.

Dwarf mistletoe's presence in the Pine Mountain Project area is a contributing factor to the development of late seral elements in infected Douglas-fir trees. Northern Spotted owls have been known to utilize mistletoe brooms as nest platforms. Douglas-fir dwarf mistletoe infections are present but not common and generally rate as a moderate infection (DMR 3 to 4). Branch deformity and brooms are normally found in crown positions near the lower third to mid upper half tree crown locations. In most cases, the upper portion of the crown in mid to late-successional-size codominant or dominant trees are healthy.

Dwarf mistletoe has been observed also in ponderosa pine. It has a definite influence on tree and stand health, particularly where edaphic (soil-related) factors or stand density place other limits on tree growth and health. Dwarf mistletoe presence is usually associated with increased inter-tree competition resulting in loss of vigor, and increasing susceptibility to attach from other forest pests

The primary area of concern is the plantations developed in the late 1970's up until the early 2000's. The primary management concern is to remove heavily infested trees to reduce potential fuel loading. To protect and to promote overall tree and stand vigor and to minimize buildup of downed fuels, it is desirable to reduce the level of infestation. This control could be achieved by removing trees with a Hawksworth Dwarf Mistletoe rating of 5 or 6. A Hawksworth rating of 6 is the most severe infestation rating. Trees with ratings of 5 or 6 are in poor health and vigor and are very prone to die, as well as infest other adjacent healthier trees.

Conk rot or Red Ring Rot (Phellinus pini): Conk rot is present within the project area. The major host is Douglas-fir but also affects pines.

Identification:*P. pini* infests the heartwood of live conifers. (USDA Forest Service, unpublished Insect and Disease Training Manual, updated and revised 2009). Infected trees are identified by the hoof-shaped to bracket-like perennial conks on stems, often issuing from knots or branch stubs.

Relevance To Tree Quality: Early decay appears as a red to purple discoloration of the heartwood; advanced decay appears as numerous small pockets (1 mm x 2 mm) containing white mycelium (this kind of rot is commonly called "white speck") decay often occurs in concentric bands or rings. The disease is spread by wind-carried spores that germinate on wounds and branch stubs. The extent of decay is usually indicated by larger size and number of conks and wider spacing between them.

Management Concern: The primary management concerns are to maintain vigorous stands and to avoid scarring trees.

From A Forest Ecosystem Point of View: Cavity nesting species take advantage of the decay pockets to form nesting sites. Advance decay contributes to the susceptibility main stem breakage forming broken tops and other such suitable nesting structure.

Velvet Top Fungus, Phaeolus schweinitzii: One of the commonest root- and butt-rotting fungi infecting many conifer species. Pine Mountain Project fruiting bodies observations were associated with Douglas-fir trees.

Identification: Annual conks usually form on old wounds on the butts of infected trees, or on the ground, coming up from a decayed root. On the tree, thin brackets grow one above the other. On the ground, the conks are circular in shape, up to 10 inches across, sunken in the canter and tapering to a short thick stalk. Conks appear in late summer and fall. When fresh, the upper surface is velvety, concentrically zoned and reddish-brown with a light yellow-brown margin. The lower surface is dirty green becoming red-brown when bruised and consists of numerous large pores with irregular outlines. The telltale fruiting bodies may not show up for many decades, and there are no other visible symptoms. By the time the fungus fruits and is visible from the outside, there is substantial decay within.

Relevance to Tree Quality: Causes a brown cubical rot in the heartwood of living trees. Decay is confined to the heartwood, within 10 feet from the ground, or roots. Old trees suffer most from infection, but the fungus can be parasitic on young trees. Infection is largely through basal wounds from fire, logging, soil compaction, or root injury. Fungus may also spread through the soil to infect roots and infection may occur through root grafts. Extreme decay frequently results in breakage or windthrow.

From A Forest Ecosystem Point of View: Velvet-top fungus works through the decomposition process to break down wood cells and slowly recycle minerals and nutrient.

Black Stain Root Disease, *Leptographium wageneri*: Black stain root disease is a vascular wilt disease that blocks the water conducting vessels of host trees. Trees with black stain root disease usually have sparse, chlorotic crowns and reduced terminal growth. Some may also have distress cone crops and basal resinosis. A mortality center is often evident, with old snags near the center, recent mortality farther out, and symptomatic, live trees at the edge. Bark beetles serve as a vector in spreading the disease.

Relevance to Tree Quality: Black stain progresses longitudinally and somewhat tangentially. Longitudinally, it forms long streaks following the wood grain. In cross section, it appears as arcs following short segments of annual rings (Figure. 10). Black stain does not cause decay. Bark beetles and woodborers frequently colonize trees infected with black stain root disease. MANAGEMENT CONCERN: The primary management concern center on preventing disease spread and minimizing site disturbance. Minimize injuries during skidding, falling and brushing operations, especially near young trees. Along skid trails remove injured trees of host species**.** Injured trees attract vectors.

From A Forest Ecosystem Point of View: Black stain root disease currently is found in small isolated patches. Black stain root disease creates snags of all sizes by causing tree mortality. It also commonly creates dead patches of small Douglas-fir trees. Trees killed by *L. wageneri* eventually contribute to levels of down wood when they break or fall over. Black stain root disease creates canopy gaps, facilitating a more diverse stand structure and at times a more diverse plant species composition, as less-susceptible or non-host trees, shrubs, and forbs are released or become established in the openings. Bark beetles frequently are attracted to trees infected with *L. wageneri*, providing good foraging habitat for woodpeckers.

Weather: Climate

The Pine Mountain Project area has a Mediterranean climate characterized by moderate temperatures, wet winters, and dry summers. Precipitation occurs primarily between October and March but can extend into May or June. Precipitation type vary depending on the location within the Pine Mountain Project area. Rain predominates in the lower elevations. Winter precipitation in the higher elevations may occurs as rain, snow, or a mixture of snow and rain. The snow level fluctuates throughout the winter in response to alternating warm and cold fronts. Shallow snow packs often build-up and then are quickly melted by rain or warm temperatures, or winds.

Weather: Drought

Native insects are a necessary part of the forest ecosystem. They are normally present at low levels and cause tree mortality only in localized areas. However, overcrowding, and weather condition that develop extended drought periods tends to cause moisture stress weakening trees and reducing their ability to withstand insect attacks. Normally trees use pitch to repel beetles trying to burrow through the bark. Drought weakened moisture stressed trees cannot produce the pitch needed to repel beetles. Enabling beetles to tunnel in and lay eggs that turn into larvae that feed on the inner bark. Attacking beetles release chemicals called pheromones that attract other beetles until a mass attack kills the tree, or spreads to include other trees.

Weather: Wind and Snow Events

Heavy snow and wind events occurred during the winter of 2009–2010. Significant damage is mostly confined to small diameter trees along the Pine Mountain Ridge area. These events have created conditions where trees and tree tops are broken-off at various heights resulting in thick accumulations of debris and material concentrated on or horizontally suspended above the ground. This situation has created excessive accumulations of surface fuel materials exacerbating potential wildfire conditions and pose a serious, ongoing threat to sustaining late-successional habitat.

Climate Change:

Climate is not the weather—it is the prevailing or general long-term weather conditions for an area. Climate change refers to changes in long-term weather patterns. Climate change has potential to move forest vegetation further from reference condition. Climate projections suggest altered precipitation regimes and increasing warming trend with warmer spring and summer temperatures

Warming and drying conditions will most likely causes increased fire activity: Other predicted effects of a warmer, drier climate include reduced growth and increased mortality (van Mantgem and Stephenson 2007, van Mantgem et al. 2009). Long-term adaptation to climate changes requires healthy and productive forests in the short term. The susceptibility and resilience of these forests to fire or pest disturbances, as well as their ability to adapt to future climate challenges may be compromised by a lack of vigor or diversity.

Warming temperatures which may lead to prolonged drought, have the potential to contribute to continued tree water-deficiencies leading to increase stress. Trees stressed by drought tend to have greater susceptibility to biotic agents such as insects and disease. Considering factors, there is a continued risk of losing older, healthy fire resilient larger diameter trees. Climate induce stress has potential to inhibit growth and vigor affecting trees throughout the diameter range including mid and late seral trees. Climate change could also inhibit growth and vigor of established plantations if such areas do not adequately adjusted to climatic alterations combined with fire suppression alterations (Innes and Peterson 2004).

These conditions have generated a perceived less sustainable system by increasing fuel risks and increasing the threat of reduced stand heterogeneity in the event of large-scale disturbances, such as from wildfire or beetle outbreak.

Desired Vegetation and Fuel Conditions

The Pine Mountain Project proposes treatments within three Management Areas and three Land Allocations as identified in the Mendocino National Forest Land and Resource Management Plan (LRMP). These Management Areas are Pine Mountain MA-20, Round Mountain MA8 and Ericson

Ridge (MA-10). Land Allocations Riparian Reserves manage prescription RX 4, Late Successional Reserves manage prescription RX 6 and Matrix manage prescription RX 7. The matrix consists of those federal lands outside the following six categories: Congressional Reserves, Riparian Reserves, Administrative Withdrawals and Late-Successional Reserves. Matrix management direction as applied to Pine Mountain Project: RX 3 Chaparral Management; RX 4 Minimal Management: RX 7 Timber Modified. (Refer to Section 2.1 Forest Plan Management Direction) Forest Plan goals, desired conditions and desired future conditions pertinent to managing vegetation in the Pine Mountain Project are summarized in **Table 7** below.

Table 5 Management Areas, Land Allocations, Pertinent Goals, Standards and Guides, Desired Conditions (DC) and Desired Future Conditions (DFC).

Management Area (MA) Land Allocation (LA)	Management Prescription	Acres within Proposed Thinning Units under Alternative 2, Proposed Action	**Forest Plan Goals, Standards and Guides, Desired Condition and Desired Future Conditions (Forest Plan & LSRA, USDA 2000)**
MA 20 - Pine Mountain (Entire MA = LA Late Successional Reserve with associated Riparian Reserves)	Rx-6 (1-5), RX 4	Goal 1=1702 Goal 2= 924 DC: (1)=5669 DC: (2)=8000 DC: (3)=5669 DC(4)=6033 1 DFC=6033 (6) Objective: 1040 2 DFC=6033 1 DC=6033 3 DFC=6033 4 DFC=1702	Goal 1: Maintain or improve the diversity and quality of habitat needed to support viable populations of all native and desired non-native wildlife and fish species.... (LRMP p. IV-4). Goal 2: Maintain and improve the ecological health of riparian and aquatic ecosystems Comment: Riparian reserve standards and guidelines (S&Gs) also apply to LSRs, and actions within riparian reserves located in LSRs must comply with all S&Gs for both land allocations. RX 6 LRMP DC: (1) Development of old-growth forest Characteristics including snags, logs on the forest floor, large trees, and canopy gaps that enable establishment of multiple tree layers and diverse species composition;

Management Area (MA) Land Allocation (LA)	Management Prescription	Acres within Proposed Thinning Units under Alternative 2, Proposed Action	**Forest Plan Goals, Standards and Guides, Desired Condition and Desired Future Conditions (Forest Plan & LSRA, USDA 2000)**
			(FSEIS ROD p. B-5) DC: (2) Prevention of large-scale disturbances by fire, wind, insects, and diseases that would destroy or limit the ability of the reserves to sustain viable forest species populations. (FSEIS ROD p. B-5) DC: (3) Thinning or managing the overstory to produce large trees; release advanced regeneration of conifers, hardwoods, or other plants: or reduce risk from fire, insects, diseases, or other environmental variables,(FSEIS ROD p. B-6) DC(4) Objective: Accelerate development of late-successional conditions 1 DFC: (5) while making the future stand less susceptible to natural disturbance. (6) Objective: To provide effective fuel breaks wherever possible.(FSEIS ROD p. C-12, 13) (Refer to LRMP IV-62 &63) LSRA 2 DFC: The long-term desired condition of the forested portion of these LSRs is characterized by: Late-successional forest stands occupy the maximum practicable and sustainable amount of the area of each LSR that is suitable for growing

Management Area (MA) Land Allocation (LA)	Management Prescription	Acres within Proposed Thinning Units under Alternative 2, Proposed Action	**Forest Plan Goals, Standards and Guides, Desired Condition and Desired Future Conditions (Forest Plan & LSRA, USDA 2000)**
			these stands.(LSRA 19) 1 DC: Stocking levels in young-growth and mature forest stands promote rapid development of old-growth characteristics (rather than rapid maturation) and protect these stands from large-scale disturbances. (LSRA 19) 3 DFC: Conifer and hardwood stand densities are low enough to survive extended droughts without excessive mortality of overstory trees from insects or disease. 4 DFC: Mid- to late-successional pine, mixed conifer, and hardwood stands are capable of enduring the effects of a mid-summer wildfire under normal severe conditions without setting the stand back to an earlier successional stage. (LSRA 20)
MA-8 Round Mountain (LA = Matrix Land with associated Riparian Reserves)	RX 7, RX 3, RX 4	364	LRMP Emphasize fuels treatment within and adjacent to plantations as a means to provide protection for plantations from wildfire. Provide a natural appearing landscape. (LRMP IV-112)
MA-10 Ericson Ridge (100 Acre LSR, Matrix Land with associated Riparian Reserves)	RX 6, RX 4 and RX 7	364	LRMP Emphasize fuels treatment within and adjacent to plantations as a means to provide protection for plantations from wildfire. 100 Acre LSR same desired condition

Management Area (MA) Land Allocation (LA)	Management Prescription	Acres within Proposed Thinning Units under Alternative 2, Proposed Action	**Forest Plan Goals, Standards and Guides, Desired Condition and Desired Future Conditions (Forest Plan & LSRA, USDA 2000)**
			as MA-20
Riparian Reserves	RX4	Goal=5093 S&G=5093 DFC=5093	Goal: Maintain and improve the ecological health of riparian and aquatic ecosystems. S&G: Maintain and restore the species composition and structural diversity of plant communities in riparian areas. DFC: Silvicultural practices for riparian reserves be applied to control stocking to acquire or maintain desired vegetation characteristics needed to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris and fine particulate organic matter sufficient to sustain physical complexity and stability.
Matrix Land with associated Riparian Reserves	RX 7 and RX 4	Goal=916 DFC=916	Goal: Provide a sustained yield of timber and other wood products to help support local economies and to contribute to meeting local, regional, and national needs. DFC: Manage with an "emphasis on timber production while providing for other resource objectives

Management Area (MA) Land Allocation (LA)	Management Prescription	Acres within Proposed Thinning Units under Alternative 2, Proposed Action	**Forest Plan Goals, Standards and Guides, Desired Condition and Desired Future Conditions (Forest Plan & LSRA, USDA 2000)**
			including visual quality, watershed, rare and endemic species, and wildlife." (LRMP, IV 69). Management Direction calls for the regulation of "… all timber yields from suitable timber lands" and to "Intensively manage timber stands for control of competing vegetation, stocking control, etc." (LRMP, IV-70).

In addition, to LRMP and LSRA desired condition guidance direction was pursued from the USF&W concern NSO habitat desired condition. USF&W suggested following their directions to private timberland in California's Northern Interior Region where the Pine Mountain Project is located. This document titled "Regulatory and Scientific Basis for U.S. Fish and Wildlife Service Guidance for Evaluation of Take for Northern Spotted Owls on Private Timberlands in California's Northern Interior Region"(CDF&G 2008) contains stand metrics needed to avoid habitat impact which would lead to NSO take situation. Table 6 presents the minimum requirements for Take Avoidance. These habitat requirement will serve to guide NSO effects analysis. Note in order to avoid take all of the structural parameters values must be achieved.

Table 6: Values for selected stand structural parameters used to classify nesting/roosting and foraging habitat for northern spotted owls in the Northern Interior Region

Parameter	**Functional Habitat Type**			
	High-quality Nesting/Roosting	**Nesting/Roosting**	**Foraging**	**Low-quality Foraging**
Basal area	≥ 210 ft2 /acre	A Mix ranging from 150 to ≥180 ft2 /acre	A Mix ranging from 120 to ≥180ft2 /acre	Mix ranging from 80 to ≥120ft2 /acre
Quadratic mean diameter	≥ 15 inches	≥ 15 inches	≥ 13 inches	≥ 11 inches
Large trees per acre ≥26 DBH	≥ 8	≥ 8	≥ 5	Not Applicable

Parameter	Functional Habitat Type			
Canopy closure	≥ 60%	≥ 60%	≥ A Mix ranging from 40 to 100%	≥ 40%

Environmental Consequences to Vegetation

Alternative 1 - No Action

Direct and Indirect Effects

By definition, direct and indirect effects (40 CFR 1508.8), and cumulative effects (40 CFR 1508.7) result from the proposed action, and thus are not germane to the no action alternative.
Under Alternative 1, no fuels treatments, forest health or habitat enhancement treatments would be implemented to accomplish the purpose and need. The intent and the desired condition set forth the LRMP and NWFP would not be achieved. Homogenous and tightly spaced forested stands would remain.

Treatment indicators

The USF&W indicators and the Trees per Acre-Diameter Class Indicators which are measurement of stand density indicates that competition-related mortality is expected to increase as resources on the sites become increasingly limited. These two factors, in combination, lend to a greater risk of large severity fires as well as greater risk of insect and disease outbreaks at a much larger scale. In addition, the potential loss of late successional habitat would have serious implications considering Pine Mountain LSR's physical location being the southernmost functioning LSR on the Mendocino National Forest. While no costs would be directly incurred with this alternative, future costs may include wildfire suppression and rehabilitation activities and potential loss of late successional habitat. Maintenance related to safety would continue to take place as needed.

Cumulative Effects

By CEQ definition, there can be no cumulative effects from no action. Also, because there are no direct or indirect effects as a result of the no action alternative, no cumulative effects would occur.

Alternative 2 - Proposed Action (prescriptions 1-7)

Project Design Criteria, Mitigation Measures and Prescription Development

The project area is a suitable candidate for landscape level fire-reintroduction once the treatment prescriptions have altered stand density and shifted forest composition and structure towards a more historic reference condition. Planned treatments are the initial step toward system resiliency and sustainability. Follow-up treatments on an as needed basis for example, thinning and prescribed fire to reduce surface fuels (including activity fuels) or maintain them in the desired condition are likely to assist in maintaining desired species and stocking; as well as, reintroducing fire as a reoccurring disturbance. Treatments would ultimately lead to a more resilient and sustainable forest.

Table 7. Proposed Treatment Prescriptions Acreage by Land Allocations

Treatment Prescriptions	LSR Acres	Matrix Acres	RR Acres LSR	RR Acres Matrix	Total Acres
Treatment Prescription 1 - Ecological Fuel Reduction Treatment -- Plantations Areas	349	15	152	0	364
Treatment Prescription 2 - Ecological Fuel Reduction Treatment -- Naturally Forested Areas	2797	726	1849	385	3523
Treatment Prescription 3 –Ecological Fuel Reduction Treatment -- Commercial Thinning	1512	190	686	92	1702
Treatment Prescription 4 - Ecological Fuel Reduction Treatment -- Shaded Fuel Break	82	63	65	56	145
Treatment Prescription 5 - Ecological Fuel Reduction Treatment -- Chaparral Management	669	1153	944	596	1822
Treatment Prescription 6 - Ecological Fuel Reduction Treatment -- Back Fire Area	444	0	268	0	444
Treatment Prescription 7 - Riparian Reserve Management**					
Total	5853	2147	3964	1129	8000

*Fuelbreak acres outside of another unit

**Prescription 7 Acres reported in the RR LSR and RR Matrix Columns

Direct and Indirect Effects of Treatment Prescription 1 - Ecological Fuel Reduction Treatment Plantations Areas

Prescription 1 was developed to treat conifer plantations to break up fuel continuity to permit future under burning and to promote habitat enhancement. The plantations are overstocked, creating conditions that contribute to tree growth and vigor impacts, which lead to an increasing susceptibility to insect and disease impacts. Trees per acre quantity represent values that lead to slower stand development through the successional stages. In addition, tree density is a factor that contributes to wildfire intensity and limits or prohibits successful prescribed fire application.

Plantation Vegetative Cover Type and Successional Stage: There are no direct effects to vegetation cover type. The cover type will remain the same. The indirect effect will be a reduced tree density. The current successional stage would not change. The prescribed fire treatment is designed to promote successional stage development through the establishment of a fire regime that reflects the historic fire regime. Treatment will be applied to stands that do not require density reduction through thinning. The density management harvest treatment is designed to protect and enhance successional stage development. Treatment will reduce the number of trees sufficiently to provide for optimal residual tree growth to advanced successional stage development. Competing brush species will be decreased. Treatment will stimulate trees that express elements associated with early, mid-successional stands encouraging a quicker advancement towards trees that will eventually express late successional forest characteristics.

Diameter Size Class: Plantation tree removal involves small diameter trees that range between 4 to 12 inches DBH. Treatment effects to diameter size class will be to emphasize retaining trees within upper end of the diameter range.

Stand Density: Thinning treatment effect will be a reduction in the average number trees per acre. Leave trees will vary within the range from 70 to 200 trees per acre. Conifer and hardwood tree species stand density would be changed to a variable spacing ranging from 15 to 30 feet. Treatment effect will be an overall increase in the average distance between trees. The stand density treatment will have the effect of reducing completion for site resources to accelerate large tree development. Stand density reduction will improve stand vigor, and resistance to insect/disease. A reduction in ladder fuels and an increase in live crown heights would reduce the wildfire risk and impacts. The reduced density will decrease prescribed fire risk enabling more effective fire use.

Where prescribed fire is applied only minimal reduction in stand density will occur. The primary goal is associated with surface fuel reduction and reducing competing vegetation between trees. The effect to average total upland canopy cover will be a change to a canopy cover that varies within the range of 40 to 60 percent. Riparian reserve tree spacing will also be 15 to 30 feet and canopy cover may also vary within the range of 40 to 60 percent. These canopy level standards will have the effect of maintaining shade cover to avert adverse site temperature effects.

Activity Fuel Treatment: The direct effect caused by thinning without activity fuel treatment is to increase wildfire hazard. (Agee and Skinner 2005). The treatment prescription proposes to apply fuel treatments as prescribed fire only or as a combination of prescribed burning, hand or mechanical density reduction (thinning), hand or mechanical piling, or chipping. Where treatment requires thinning and activity fuel are created prescribed fire will be used to abate post thinning activity fuels to maintain surface fuel desired condition. Prescribed fire may be applied as broadcast burning, pile burning or combined treatment.

Acreage: Acreage occupied by the present seral stage is not expected to change classifications. No direct seral stage change. The indirect effects to seral stage will occur over time as a result attributed to increased individual tree growth.

Conclusion: Treatment effects will provide habitat protection and enhancement through reduce stocking levels or reduction in surface fuels in order to make plantation stands more resilient to disturbances like insects, disease, drought, and wildfire. Density reduction treatment effects will enable prescribed fire application. Treatment effects will reduce competition to increase growth rates to advance large tree development. Treatment effects will promote black oak retention to promote habitat diversity enhancement for cavity nesting and mast eating animals. Treatment effect will reduce surface and ladder fuel densities. Follow up activity fuel treatment will abate effects of treatment generated slash and debris.

Direct and Indirect Effects of Treatment Prescription 2 - Ecological Fuel Reduction Treatment -- Naturally Forested Areas

Prescription 2 was developed to promote or sustain late successional habitat within Naturally Forested Areas and adjacent vegetation types to address vegetation densities on the lower slopes to near watercourse areas where a commercial treatment was considered not feasible based on topography, slope, or late successional habitat sensitivity. The treatments are designed to break up fuel continuity to permit future under burning and to promote habitat enhancement. Naturally Forested Areas are overstocked, creating conditions that impede late successional habitat quality, development and contribute to tree growth and vigor impacts, which lead to an increasing susceptibility to insect and disease impacts. The Natural stands high densities of trees less than or equal to 10 inches DBH contribute to high ladder fuel concentrations. Mortality in the natural stands lower story component is contributing to excessive surface fuel buildup a factor that contributes to wildfire intensity and limits or prohibits successful prescribed fire application.

Table 8Treatment Prescription 2 Treatment Acres and Land Designation

Treatment Prescriptions	Land Designation				Total Acres
	LSR Acres	Matrix Acres	RR Acres LSR	RR Acres Matrix	

Treatment Prescription 2 - Ecological Fuel Reduction Treatment -- Naturally Forested Areas	2797	726	1849	385	3523

Vegetation effects analysis will focus on issues related to vegetation habitat protection and enhancement (long-term forest health and Wildlife Habitat). Vegetation effect to vegetative cover type and seral stage conditions, diameter size class, stand density, activity fuels and acreage involved will be discussed. Existing conditions led to treatment Prescription 2 development.

Natural Forested Area Vegetative Cover Type and Successional Stage: Ecological fuel reduction will have the effect of reducing surface fuels and ladder fuels. There are no direct effects to vegetation cover type. The cover type will remain the same. Treatment effect will provide a post treatment canopy cover range within 50 to 80 percent. The treatment effect to perennial riparian reserve canopy cover will be to maintain at least 60 percent cover, and the stream side management zone canopy cover will be retained at a minimum 70 percent cover. The canopy retention level will have the effect of minimizing or negate changes to evaporation rates or water temperatures. Refer to the Hydrologist report (USDA 2017f) for more detailed discussion concerning evaporation rates and water temperature.

The indirect effect will be a reduced vegetation density. The current successional stage would not change. The effect from the density management treatment will serve to protect and enhance the structural habitat characteristics attributed to the large tree component. Treatment will reduce the number of understory trees contributing to ladder fuel concentrations making the treatment area less susceptible to crown fire within the upper-story trees. Treatment effect will reduce the number of trees to provide for reduced competition between residual trees to assist successional stage development. The treatment effect will serve to enhance plant community health and biodiversity.

Diameter Size Class: The natural stands contain large diameter conifer and hardwood trees over dense conifer reproduction and or brush. No effects to the upper story large diameter conifer and hardwood trees. Prescription 2 treatment primarily involves lower story tree removal within the DBH ranges of 4 to less 10 inches. Treatments effects to the lower story trees will be an emphasis to retain trees within upper end of the diameter size class.

Stand Density: Prescription 2 treatment would have a direct effect to stand density by the reduction in lower story tree density. The effect to conifer and hardwood tree species would be increased spacing range to 15 to 25 feet based on measurement taken from the larger diameter upper story trees. Lower story conifer trees with the potential to interfere with black oak canopies will be removed. The treatment effect to black oak trees will serve to enhance plant community health and biodiversity. Prescribed burning may include various types of burning such as pile burning, understory burning and jackpot burning. Prescribed fire may be applied as pre-thinning prescribed burning, post-thinning prescribed burning, or as prescribed burning only.Where prescribed fire is applied the effects only minimal reduction in stand density will occur. The primary effect is surface fuel reduction. Because of the low fire intensity required to limit impacts, treatment will result in only a minor reduction is small diameter trees. Prescribe fire treatment only effect will result in prescribed fire requiring several entries to achieve desired conditions.

Activity Fuel Treatment: The direct effect caused by thinning without activity fuel treatment is to increase wildfire hazard. (Agee and Skinner 2005). The treatment prescription proposes to apply fuel treatments as prescribed fire only or as a combination of prescribed burning, hand or mechanical density reduction (thinning), hand or mechanical piling, or chipping. Where treatment requires thinning and activity fuel are created prescribed fire will be used to abate post thinning activity fuels to maintain surface fuel desired condition. Prescribed fire may be applied as broadcast burning, pile burning or combined treatment.

Acreage: Acreage occupied by the present seral stage is not expected to change classifications. No direct seral stage change. The indirect effects to seral stage will occur over time as a result attributed to increased individual tree growth.

Conclusion: Treatment effects will provide habitat protection and enhancement through reduce stocking levels or reduction in surface fuels in order to make stands more resilient to disturbances like insects, disease, drought, and wildfire. Density reduction treatment effects will enable prescribed fire application. Treatment effects will reduce competition to increase growth rates to advance large tree development. Treatment effects will promote black oak retention to promote habitat diversity enhancement for cavity nesting and mast eating animals. Treatment effects will reduce surface and ladder fuel densities. Follow up activity fuel treatment will abate effects of treatment generated slash and debris.

Direct and Indirect Effects of Treatment Prescription 3 – Ecological Fuel Reduction Treatment -- Commercial Thinning

(Existing Condition overview)

Applied ecological thinning treatments aim to enhance biodiversity through focusing tree retention on leave trees that provide habitat with structural diversity more suitable to late successional species. Ecological enhancement thinning addresses appropriate tree density reduction to open the lower story canopy to enhance NSO / late-successional habitat, reduce inter-tree competition and develop resiliency. Prescription 3 was developed to promote or sustain late successional habitat by working within current stand heterogeneity. The current heterogeneity is expressed in the variable density found in stand structure as related to tree size distribution, stem spatial patterns, species composition and stand dynamic processes (growth, mortality and regeneration). Ecological enhancement thinning will incorporate the intermediate silvicultural practice thinning from below combined with certain aspects of variable density thinning.

Thinning treatment will reduce stand density to improve growth and yield, enhance stand health, and reduce potential mortality. More specifically thinning from below is the removal of trees primarily from the lower crown classes to favor those in the upper crown classes. Thinning reduces competition between trees for onsite resources such as light, water, and nutrients. Stand density varies, but stands selected for thinning are typically well stocked or overstocked and have sufficient density to respond to thinning treatment.

Prescription 3 treatment areas overall conifer vegetation type is expressed as a "Sierra mixed conifer stand type". This type is generally described as stands with as many as three different commercial conifer species, but may have as few as two of these species as canopy co-dominants. Minimum conifer species composition consists of at least ten percent. Stands are usually characterized by a combination of Douglas-fir, ponderosa pine, and sugar pine.

Associated common hardwood species are black oak, canyon live oak, and madrone. Some areas may express a Douglas-fir or ponderosa pine type dominance. In addition to conifer dominated vegetation types, the Montane Hardwood-Conifer type is associated with some of the treatment units as a transitional type between dense coniferous forests and montane hardwood, mixed chaparral, or open woodlands and savannahs.

Prescription 3 treatment units consist of mixture of the following California Wildlife Habitat Relationship system vegetation types. The treatment units express components of early, mid, late to mature seral stages and early, mid, late successional stages. The existing conditions seral and successional stages in terms of acreage present is represented as mid seral or mid successional stage (Refer to Table 16 Existing Commercial Treatment Units CWHR Forest Vegetation Types & Seral Stages, Silviculture Report, USDA 2017b) .

Species Composition

No pure old growth stands as defined in Potter et al. 1992 were found in these units. However, treatment unit stand structure includes two or sometimes three storied stands that contain a remnant old growth component expressed as scattered single trees or found in a group clumplike distribution.

Field observations indicate that the general conifer tree distribution is consistent over the treatment area, but hardwood distribution tends to occur as individual trees or concentrated groups ranging from one half acre to five acres. Hardwoods along with the larger remnant conifers contribute to late seral structural habitat elements such as large branches, cavities and other structures suitable for nesting, denning and resting habitat for late successional wildlife. The larger diameter hardwood trees which express healthy, large vigorous crowns provide vertical stand diversity, browse, mast and prey for wildlife species; contributing to functional habitat for goshawks, fishers and NSO. In response to the presence of concentrated hardwood groups, hardwood retention group areas shall be established.

The current species distribution percentages indicate that 66 percent of the forested treatment area is Douglas-fir, 9 percent ponderosa pine, 12 percent sugar pine and 13 percent hardwoods. Post treatment molded effects yield species distribution percentages that indicated a decrease in Douglas-fir percentages and an increase in ponderosa, sugar pine and hardwoods.

(Effects Analysis)
Prescription 3 treatment will have the effect of changing the dominance of seral stages. Currently, nineteen units represent mid seral or mid successional stage and nineteen are present as mature seral or late successional. The treatment effect will enhance the seral and successional stages through density reduction of smaller diameter trees. The seral and successional stage of nineteen units currently classified as mature seral or late successional will remain the same, but the other nineteen units seral and successional stages will change post treatment to mature seral and late successional stage. Refer to Table 9Existing and Post Treatment Commercial Units Successional and Seral Stages

Table 9. Existing and Post Treatment Commercial Units Successional and Seral Stages

Seral or Successional Stage Effects		Existing Conditions (acres)	Post Treatment Condition (acres)	Effect
Seral Stage	Early	21	21	No Effect
	Mid	1014	0	Changed from Mid to Late
	Late	0	24	Acreage Increase
	Mature	666	1656	Enhanced

Seral or Successional Stage Effects		Existing Conditions (acres)	Post Treatment Condition (acres)	Effect
Successional Stage	Early	21	21	No Effect
	Mid	1014	17	Changed from Mid to Late
	Late	666	1663	Acreage Increase

Seral stage changes - Acres of early seral remained the same post treatment. 24 acres moved from mid to late seral post treatment. 990 acres of mid seral moved to mature seral post treatment (total of 1656 acres).

Successional stage changes - 21 acres of early successional remained the same post treatment. 17 acres of mid successional remained unchanged post treatment. The rest of mid successional (997 acres) moved into late successional habitat (total of 1663 acres).

Trees per Acre(TPA)-Diameter Size Class Indicator:
Treatment effects have been evaluated utilizing the following diameter size classes: Total Existing Trees per Acre, Existing Trees per Acre Less than 10" DBH and Existing Trees per Acre Greater than 10" DBH compared to Post treatment values in each diameter size class.

Existing Stand Conditions reflect a size class distribution that represents high densities of trees less than 10 inches DBH. Trees per acre 10 inches DBH or less range is 0 to 1518. Trees per acre 10 inches DBH or greater range is 43 to 226 trees per acre. Refer to Table 10for unit specific values. Number values represent conifer and hardwood species.

Table 10 Existing and Post Treatment Trees per Acre Diameter Size Class

All Units	Unit Acres	Total Existing Trees per acre	Existing Trees per Acre Greater than 10" DBH	Existing Trees per Acre Less than 10" DBH	Total post treatment Trees per acre	Post Treatment Trees per Acre Greater than 10" DBH	Total Post Treatment Trees per Acre Less than 10" DBH
Average	45	500	103	398	100	50	50
Max	143	1619	226	1518	478	113	388
Min	5	65	43	0	17	17	0

USF&W Trees Greater Than or Equal to 26 Inches DBH per acre Indicator:
Calculation to assess tree distribution changes, were performed to determine the retention quantity for trees greater than or equal to 26 inches DBH. Refer to the Silviculture Report (USDA 2017b) Table 21 Nesting, Table 22 Foraging and Table 23 Dispersal which presents the existing condition indicator values and post treatment and future conditions indicator values modeled by FVS for each unit. Presented below are Table 11 Nesting, Table 12Foraging, and Table 13Dispersal with the average values.

Table 11. Existing and Post Treatment Nesting Average Trees Greater Than or Equal to 26 Inches DBH per Acre

Nesting TPA≥26	Existing Condition	Post Treatment	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
	2016	2018	2023	2024	2034	2035	2044	2045
Unit	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26
Average	27	24	25	25	26	26	28	28
Max	44	34	34	33	32	32	32	32
Min	12	13	15	15	19	20	23	24

Three out of four meet USF&W nesting values Nesting units 3A and 33B initial treatment effects enhance habitat increasing the number of trees greater than or equal to 26 inches DBH. Unit 19 remains the same, and Unit 24B treatment effect is within habitat range. Prescribed fire treatment effects assist to sustain initial treatment effects.

Table 12. Existing and Post Treatment Foraging Average Trees Greater Than or Equal to 26 Inches DBH per Acre

Forage TPA≥26	Existing Condition	Post Treatment	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
	2016	2018	2023	2024	2034	2035	2044	2045
Unit	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26
Average	16	17	18	18	22	22	25	25
Max	30	28	30	30	33	33	34	33
Min	4	4	4	4	10	10	12	12

Two of the thirty unit existing condition values do not meet USW&F parameters, but treatment effect do not cause a change. Ten foraging units' treatment effects enhance habitat increasing the number of trees greater than or equal to 26 inches DBH. Fourteen units remains the same, and four units treatment effect is within habitat range.

Table 13.Existing and Post Treatment Dispersal Average Trees Greater Than or Equal to 26 Inches DBH per Are

Dispersal TPA≥26	Existing Condition	Post Treatment	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
	2016	2018	2023	2024	2034	2035	2044	2045
Unit	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26	TPA ≥ 26
Average	21	21	21	22	23	23	26	26
Max	26	24	24	24	25	25	31	31
Min	12	13	14	15	21	22	23	23

All dispersal units' existing condition values meet the foraging parameters and three out of four meet nesting values. After treatment all meet nesting value. Dispersal units 31 and 18 treatment effects enhance habitat increasing the number of trees greater than or equal to 26 inches DBH. Unit 24A and 24D treatment effect are within habitat range. Prescribed fire treatment effects assist to sustain initial treatment effects.Refer to the Silviculture Report (USDA 2017b) for more information.

USF&W Quadric Mean Diameter per acre indicator:

Quadratic Mean Diameter (QMD): Calculation to assess tree distribution were performed to determine the quadratic mean diameters (QMD).QMD is an expression of the diameter of the tree with the average basal area. Therefore, QMD gives greater weight to large trees. QMD may be equal to but is usually greater than the arithmetic mean (Curtis & Marshall 2000). QMD is also stable for modeling purposes, being better correlated to stand density and directly convertible to basal area. The Forest Vegetation Simulator (FVS) uses QMD in many equations. QMD is a stand attribute that is used to describe wildlife habitat. Refer to the wildlife specialist Biological Assessment/Biological Evaluation of Terrestrial Wildlife Species report (USDA 2017c) for associated treatment effects. QMD is also a variable for calculating SDI. QMD combined with TPA also reflects the number of small diameter trees that may function as ladder fuels Calculation to assess QMD changes, were performed to determine the effects to QMD. Refer to the Silviculture Report Table 12 Nesting, Table 25 Foraging and Table 26 Dispersal which presents the existing condition indicator values and post treatment and future conditions indicator values modeled by FVS for each unit. Presented below are Table 14 Nesting, Table 15Foraging, and Table 16 Dispersal with the average values.

Table 14. Existing and Post Treatment Nesting QMD per Acre

Nesting QMD	Existing Condition	Post-Harvest	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
Units	**2016**	**2018**	**2023**	**2024**	**2034**	**2035**	**2044**	**2045**
	QMD	**QMD**	**QMD**	**QMD**	**QMD**	**QMD**	**QMD**	**QMD**
Average	12	21	21	21	18	19	17	18
Max	19	25	25	25	21	22	19	20
Min	7	15	16	16	16	16	16	16

Only one units' existing condition meets USF&W values. After treatment all nesting units' treatment effects enhance habitat increasing the QMD within the range of nesting parameters. Resulting in treatment effects that are a greater reflection of late-successional habitat. Prescribed fire treatment effects assist to sustain initial treatment effects

Table 15. Existing and Post Treatment Foraging QMD per Acre

Foraging QMD	Existing Condition	Post-Harvest	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
Units	**2016**	**2018**	**2023**	**2024**	**2034**	**2035**	**2044**	**2045**
	QMD	**QMD**	**QMD**	**QMD**	**QMD**	**QMD**	**QMD**	**QMD**
Average	**12**	**20**	**21**	**21**	**17**	**17**	**15**	**16**
Max	**27**	**35**	**36**	**37**	**22**	**23**	**18**	**19**
Min	**6**	**12**	**12**	**13**	**12**	**12**	**12**	**12**

Twenty one units' existing conditions do not meet USF&W foraging requirement. Six units existing conditions meet low quality foraging values. Nine units existing conditions meet USF&W parameters. Treatment effects for all foraging units' enhance habitat increasing the QMD to values that meet or exceed USF&G foraging parameters. Post treatment twenty five units' QMD values are represent nesting values while only two units have value that meet low quality foraging. Prescribed fire treatment effects assist to sustain initial treatment effects, and post fire treatment 2024the two low quality units are enhanced to foraging. The overall treatment effects are a greater reflection of late-successional habitat. In addition, the existing QMD typifies mid seral habitat conditions. Post treatment QMD value are representative of late seral habitat conditions.

Table 16. Existing and Post Treatment Dispersal QMD per Acre

Dispersal QMD	Existing Condition	Post Treatment	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
Units	**2016**	**2018**	**2023**	**2024**	**2034**	**2035**	**2044**	**2045**

	QMD	QMD	QMD	QMD	QMD	QMD	QMD	QMD
Average	**11**	**20**	**21**	**21**	**17**	**17**	**15**	**16**
Max	15	24	24	24	19	19	16	17
Min	7	16	17	17	15	15	14	14

Two units existing conditions do not meet USF&W foraging requirement. One unit has values associated with nesting, and one unit has values associated with foraging. All Dispersal units' treatment effects enhance habitat increasing the QMD. Post treatment all express values associated with nesting parameters. The overall treatment effects are a greater reflection of late-successional habitat. Prescribed fire treatment effects assist to sustain initial treatment effects. Therefore, the treatment effect is to enhance the quality of late-successional habitat structure.

USF&W Total Basal Area per acre Indicator:

Basal Area: Basal area is a measure of stand density or stocking. Basal area is the cross section area of a tree stem in square feet measured at breast height (4.5 feet above ground) and inclusive of bark. Stocking density is determined by the sum of the basal areas for all trees on a per-acre basis. Basal area was the determining variable used to model residual stand density and canopy cover levels. Basal area is a measurement used to describe stand stocking levels for wildlife habitat.

Calculation to assess Basal Area changes, were performed to determine the effects to Basal Area. Refer to the Silviculture Report (USDA 2017b) Table 27 Nesting, Table 28 Foraging and Table 29 Dispersal which presents the existing condition indicator values and post treatment and future conditions indicator values modeled by FVS for each unit. Presented below are Table 17Nesting, Table 18Foraging, and Table 19Dispersal with the average values.

Table 17.Existing and Post Treatment Nesting Total Basal Area per Acre

Nesting TOTAL BASAL AREA	Existing Condition	Post-Harvest	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
	2016	2018	2023	2024	2034	2035	2044	2045
Unit	Total BA	Total BA	Total BA	Total BA	Total BA	Total BA	Total BA	Total BA
Average	261	204	215	215	234	229	242	239
Max	330	254	264	264	278	272	281	275
Min	215	160	165	162	178	178	193	194

All units existing conditions represent USF&W nesting basal area values. Treatment effects keep all Nesting units within the nesting total basal area habitat range, and maintain late-successional habitat. Prescribed fire treatment effects assist to sustain initial treatment effects.

Table 18. Existing and Post Treatment Foraging Total Basal Area per Acre

TOTAL BASAL AREA	Existing Condition	Post-Harvest	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
	2016	**2018**	**2023**	**2024**	**2034**	**2035**	**2044**	**2045**
Unit	**Total BA**	**Total BA**	**Total BA**	**Total BA**	**Total BA**	**Total BA**	**Total BA**	**Total BA**
Average	258	162	172	172	193	193	212	212
Max	367	218	226	225	248	247	278	281
Min	177	133	139	140	149	149	157	158

All units existing conditions represent USF&W foraging basal area values. Treatment effects keep all foraging units within the foraging total basal area habitat range, and maintain late-successional habitat. Prescribed fire treatment effects assist to sustain initial treatment effects. (see Silviculture Report, USDA 2017b, Table 28 Foraging Total Basal Area per Acre).

Table 19.Existing and Post Treatment Dispersal Total Basal Area per Acre

TOTAL BASAL AREA	*Existing Condition*	*Post-Harvest*	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
Year	**2016**	**2018**	**2023**	**2024**	**2034**	**2035**	**2044**	**2045**
Unit	**Total BA**	**Total BA**	**Total BA**	**Total BA**	**Total BA**	**Total BA**	**Total BA**	**Total BA**
Average	257	151	160	162	182	181	201	201
Max	307	158	168	169	189	187	206	206
Min	203	136	145	146	167	169	190	191

All Dispersal units' treatment effects are within the USF&W foraging total basal area habitat range, and maintain late-successional habitat. Prescribed fire treatment effects assist to sustain initial treatment effects. (see Silviculture Report, USDA 2017b, Table 29 Dispersal Total Basal Area per Acre for details).

U. S Fish & Wildlife Percent Canopy Cover per Acre:

Canopy cover is the degree to which the canopy (forest layers above one's head) blocks sunlight or obscures the sky. Canopy cover relates to the ground area covered by a vertical projection of the canopy, and is expressed as a percent of ground area covered. Canopy cover is another stand attribute that is used to describe wildlife habitat and fuel hazard conditions. Refer to the Fire and Fuels Specialist Report (USDA 2016c) and the wildlife specialist Biological Assessment/Biological Evaluation of Terrestrial Wildlife Species report (USDA 2017c) for associated treatment effects.

Calculation to assess Basal Area changes, were performed to determine the effects to percent canopy cover. Refer to the Silviculture Report (USDA 2017b) Table 30 Nesting, Table 31 Foraging and Table 32 Dispersal which presents the existing condition indicator values and post treatment and future conditions indicator values modeled by FVS for each unit. Presented below are Table 20Nesting, Table 21Foraging, and Table 22 Dispersal with average values.

Table 20Existing and Post Treatment Nesting Percent Canopy Cover per Acre

CANOPY COVER	Existing Condition	Post-Harvest	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
	2016	2018	2023	2024	2034	2035	2044	2045
Unit	Canopy	Canopy	Canopy	Canopy	Canopy	Canopy	Canopy	Canopy
Average	74	64	65	64	65	63	63	61
Max	81	71	71	71	70	67	65	64
Min	67	60	60	59	61	60	60	59

All Nesting units' treatment effects are within the USF&W nesting percent canopy habitat range, and maintain late-successional habitat. Prescribed fire treatment effects assist to sustain initial treatment effects.

Table 21Existing and Post Treatment Forage Percent Canopy Cover per Acre

CANOPY COVER	Existing Condition	Post-Harvest	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
	2016	2018	2023	2024	2034	2035	2044	2045
Unit	Canopy	Canopy	Canopy	Canopy	Canopy	Canopy	Canopy	Canopy
Average	74	53	54	54	57	56	59	59
Max	92	74	75	75	78	77	79	79
Min	53	40	40	40	44	44	47	47

All Foraging units' treatment effects are within the USF&W foraging percent canopy habitat range, and maintain late-successional habitat. Prescribed fire treatment assist to sustain initial treatment effects.

Table 22. Existing and Post Treatment Dispersal Percent Canopy Cover per Acre

CANOPY COVER	ACRES PER UNIT	Existing Condition	Post-Harvest	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
		2016	2018	2023	2024	2034	2035	2044	2045
Unit	Acres	Canopy	Canopy	Canopy	Canopy	Canopy	Canopy	Canopy	Canopy
Average	26	74	55	56	56	59	58	62	61
Max	45	85	64	65	66	68	66	69	68
Min	14	61	40	41	42	46	46	50	50

All Dispersal units' treatment effects are within the USF&W percent canopy habitat range, and maintain late-successional habitat. Prescribed fire treatment effects assist to sustain initial treatment effects.

Stand Density Index Indicator:

Stand Density Index (SDI) is a method of characterizing stand density that uses both tree diameter at breast height (DBH) and trees per acre (TPA). SDI, developed by Dunning and Reineke (1933)**,** provides a measurable means to establish the relationship between current stocking and the potential maximum stocking. SDI can also be used as a species-specific measure of tree competition for resources (nutrients, water, and sunlight). SDI has an advantage over basal area because it is not significantly affected by age and site quality.

The calculated SDIs values were evaluated based on density ranges low, moderate, high and extremely high density. Table 24 displays the maximum SDI for the major species within the Pine Mountain Project Area, and the percent of maximum SDI range levels at different stocking densities(Long 1985).Because Douglas-fir is the overall dominate basal area species, SDI effects analysis utilized Douglas-fir maximum SDI value to determine effects level. Refer to Table 23Existing and FVS Projected Stand Density Index Response to Treatment.

Table 23.Existing and Post Treatment FVS Projected Stand Density Index Response to Treatment

Stand Density Index	Existing Condition	Post-Harvest	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire	Before Rx Fire	Post Rx Fire
	2016	2018	2023	2024	2034	2035	2044	2045
All Units	SDI	SDI	SDI	SDI	SDI	SDI	SDI	SDI
Average	460	172	181	183	232	231	273	269
Max	756	310	319	319	367	354	388	375
Min	289	144	150	152	190	188	217	215

Table 24. Base Line Stand Density Index

Species	DF	PP	SP	BO	MD	Site Occupancy

Max SDI	547	571	647	382	588	
Density Range	**% Maximum SDI***					
Low Density 0-24.9%	**0-136**	**0-142**	**0-161**	**0-95**	**0-146**	**Less than full site occupancy, No competition between trees**
Moderate Density 25-34%	**137-190**	**143-199**	**162-225**	**96-133**	**147-205**	**Less than full site occupancy, Onset of competition between trees - 25 percent of maximum SDI**
High Density 35-55%	**191-305**	**200-319**	**226-361**	**134-213**	**206-328**	**Full site occupancy—35 percent of maximum SDI, Active competition between trees, Upper range of zone marks the threshold for the onset of density-related mortality**
Extreme High Density 56%+	**306+**	**320+**	**362+**	**214+**	**329+**	**Full site occupancy, Severe competition between trees, Active competition-induced mortality**

DF - Douglas fir, PP - ponderosa pine, SP- sugar pine, BO - black oak, MD - Pacific madrone

The Existing and FVS Projected Stand Density Index Response to Treatment indicates that 36 out of the 38 treatment units are within the zone of extreme high density where full site occupancy, severe competition between trees and active competition-induced mortality is occurring. The other two treatment units fall within the zone of full site occupancy where there is active competition between trees. These units are also within the upper range of the zone that marks the threshold for the onset of density-related mortality.

Stand densities will be reduced in all treatment units. Treatment effect is to move 30 treatment units SDI from extreme high density to the moderate density zone of Less than full site occupancy. 6 treatment units remain in the high density zone, and 2 units moves from extreme high density zone to the high density zone.

Studies have shown that accelerated development of many of the structural components of late-successional stands can be achieved (Oliver 1992, Marshall 1991) through reduced stand density that provide fewer small diameter trees and wider spacing between residual larger diameter trees. The effect to late successional habitat is to provide the site condition to develop structural characteristics for late successional species. Thinning effects reduce the stand density of trees to improve growth and yield, enhance stand health, and reduce potential mortality. More specifically, thinning from below and planned variable density thinning, effects the removal of trees primarily from the lower crown classes to favor those in the upper crown classes, or specific species or species groups where density encroachment is creating a decline is species diversity.

The treatment effect which changes the SDI density range will have an overall effect to enhance development and promote longevity to continue late successional habitat into the future. The post treatment forest will reflect late successional forest structure with competition levels similar to historic conditions. Stand density will be at a level where prescribed fire can be applied to maintain and enhance stand structure into the future.

Direct and Indirect Effects of Treatment Prescription 4 - Shaded Fuel Break

The treatment areas associated with this prescription are divided into two 500 foot wide shaded fuel breaks along National Forest System land bordering roads. A 500-foot wide shaded fuelbreak will be constructed beginning at the intersection of Elk Mountain Road (M-1) and forest road 18N05. Heading westward along portions of forest road 18N05, 17N23, 18N69 and 18N47, following the Pine Mountain ridge and tying into forest road M-8. The shaded fuelbreak will provide a defensible space for fires originating from the west and moving eastward with the prevailing winds, and also serve to assist prescribed fire activities.

Another 500 foot wide shaded fuelbreak will be constructed along portions of Elk Mountain Road that pass through National Forest land. Derived benefits stem from having a defensible space associated with Elk Mountain Road which is the main access route from Upper Lake, through the LSR, to the Pillsbury Basin. Prescribed fire activities will be able to utilize the fuelbreak as a staging area. Prescription 4 was developed to establish strategic fuel breaks slow and control the spread of wildfires

Vegetative Cover Type: The two Fuelbreaks associated with treatment prescription 4 pass along a variety of vegetation types. The California Wildlife Habitat Relationship system identified eight different vegetation types. Table 25displays the various vegetation type acreages in terms of California Wildlife Habitat Relationship vegetation types.

Table 25. CWHR Vegetation Types Treatment Prescription 4 Acreage

CWHRTYPE CODE	CWHR Vegetation Type	Acreage
COW	**Coastal Oak Woodland**	9
CPC	**Closed Cone Pine**	4
DFR	**Douglas fir**	37
MCH	**Mixed Chaparral**	35
MHC	**Montane Hardwood Conifer**	122
MHW	**Montane Hardwood**	24
PPN	**Ponderosa Pine**	66

CWHRTYPE CODE	CWHR Vegetation Type	Acreage
SMC	**Sierran Mixed Conifer**	743
	Grand Total:	**1040**

Since the majority of the acre associated with Prescription 4 treatment is within the commercial treatment units and follows prescription 3 guidance, refer to Prescription 3 effects analysis. The indirect effect will be a reduced tree density and the potential to slow the spread of wildfire if it occurs in the area.

Diameter Size Class: The direct effect to size class will be the maintenance of the large tree component made up of black oak, sugar pine, ponderosa pine, and Douglas-fir and a reduction in the number of trees less than or equal to 10 inches DBH. Refer to the Fire and Fuels Report (USDA 2016c).

Stand density: Direct effects to stand density within commercial units were discussed in Prescription 1-3 and 5-7. The direct effects to stand density associated with the area outside of commercial units are a reduction in tree and brush densities. Fuel treatment and prescribed fire design standards were developed to minimize potential impacts to stand density. The hand piling, pile burning and under burning of pre-existing surface downed woody debris and activity fuels would have the direct effect of reducing surface fuel loads to 5-10 tons per acre. Refer to the Fire and Fuels report (USDA 2016c). Indirect effects, as mentioned previously include a potential change in fire behavior if wildfire occurs in the Pine Mountain vicinity.

Activity Fuel Treatment: The direct effect caused by thinning without activity fuel treatment is to increase wildfire hazard. (Agee and Skinner 2005). (Placeholder1) The treatment prescription proposes to apply fuel treatments as prescribed fire or as a combination of prescribed burning, hand or mechanical density reduction (thinning), hand or mechanical piling, or chipping. Where treatment requires thinning and activity fuel are created prescribed fire will be used to abate post thinning activity fuels to maintain surface fuel desired condition. Prescribed fire may be applied as broadcast burning, pile burning or combined treatment. The direct effects would be a reduction in fuels and indirect effects would be an expected change in fire behavior in this area if a wildfire were to occur.

Acreage: Acreage occupied by the present seral stage will change as described in treatment prescription 3. Direct effects to seral stage is a change in acreage form mid seral stage to mature seral stage. Refer to treatment prescription 3. The indirect effects to seral stage will occur over time as a result attributed to increased individual tree growth. Prescription 4 fuel reduction activities will have the effect of establishing safer and more effective anchor points for fire-suppression efforts, and contribute to the creation of effective ignition zones for future prescribed fire activities. Shaded fuelbreaks effects will be a reduction in the amount of fuel, modify the types of fuel and improve their arrangement. Refer to the Fire and Fuels Report (USDA 2016c).

Canopy: The shaded fuelbreak treatment will have the effect of leaving the forest canopy intact consistent with late successional species habitat needs. The effect of the shade cast by the forest canopy helps to reduce the regeneration of plants on the forest floor. In turn, keeping the amount of fuel low prolonging the fuelbreaks effective period. **Note:** A shaded fuelbreak differs from a firebreak where a bulldozer or other equipment is used to create a bare-ground break with no vegetation

Conclusion: Direct and indirect effects of the proposed action are not considered adverse from a vegetation management perspective, but rather beneficial in reducing excess surface fuel hazard and potential wildfire impacts. Treatment is expected to combine with other project area treatments to reduce the risks of natural disturbances to the Pine Mountain Late Successional Reserve.

Direct and Indirect Effects of Treatment Prescription 5 - Chaparral Management

The treatment consists of using prescribed fire as the primary tool for strategic fuel reduction that breaks up the continuity of large chaparral fields without resulting in large-scale changes in habitat type. Prescribed burning will be conducted in such a manner to limit moderate intensity fire from entering adjacent vegetation types. The effect of prescribed fire use will be to stimulate chaparral regeneration, contribute to the development of diversity in seral stages and reducing fuel loading. Burning would be performed by hand and/or aerial ignition sources. Within the treatment areas, the effect will be the development of a mosaic burn severity pattern. In general, this mosaic would be based on existing vegetation conditions.

Chaparral treatment area accounts for approximately 1822 acres of the project area and typically occurs intermixed with chaparral and other forested vegetation types. Within the unit boundaries chaparral patches ranging from 3 to 40 acres in size make up approximately 32 percent of the treatment area. Table 26displays the treatment area’s vegetation types in terms of California Wildlife Habitat Relationship vegetation types; seral stage; and acreage associated with different vegetation types.

Table 26. Vegetation Types and Seral Stage Treatment Prescription 5 Acreage

Unit	CWHR Vegetation Type

Number Seral Stage	Annual Grass Land	Blue Oak Foothill Pine	Blue Oak Woodland	Coastal Oak Woodland	Chamise-Redshank Chaparral	Douglas fir	Mixed Chaparral	Montane Hardwood Conifer	Montane Hardwood	Ponderosa Pine	Sierran Mixed Conifer	Total Acres
88	**8**			**6**	**119**	**5**	**135**	**64**	**237**	**11**	**53**	**637**
Early									**3**			
Mid				6				7	**77**	**8**	**1**	
Late						1		33	**12**		**29**	
Mature						4		24	**145**	**3**	**23**	
Decadent					**119**		**135**					
N/A	**8**											
89	**5**	**1**	**6**		**102**	**28**	**250**	**205**	**507**	**8**	**73**	**1185**
Early								**1**	4			
Mid		**1**	**6**			4		**20**	**472**	8	2	
Late						24		184	34		65	
Mature											6	
Decadent					**102**		**250**					
N/A	**5**											
Grand Total	**13**	**1**	**6**	**6**	**221**	**33**	**385**	**269**	**744**	**19**	**126**	**1822**

Vegetation Structure – Size Class and Density

Chaparral Vegetation: In general, chaparral is considered an early-successional vegetation type because it quickly establishes on a site following a disturbance such as high intensity wildfire. However, stand characteristics within the chaparral vegetation type are not static and change over time. Thus, there are seral stages within the chaparral vegetation type. The California Wildlife Habitat Relationship system describes shrub seral stages in terms of seedling shrub, young shrub, mature shrub or Decadent shrub. Classification is based on the time lapse since the last disturbance event. Since the last known wildfire to take place with the chaparral stands associated with the treatment area occurred in 1932, the project area chaparral shrubland is classified using the California Wildlife Habitat Relationship system to fall within size class descriptions of decadent.

Forest Vegetation: The treatment area forested habitat occurs in a mosaic-like pattern with small pure stands of conifers interspersed with stands of broad-leaved trees. Conifer vegetation type makes up 10 percent of the treatment area, and hardwood vegetation types make up 57 percent. The size class distribution is reflective of the cover type present. There may be a pronounced upper layer of hardwoods with either a shrub stratum underneath or even a conifer seedling/sapling stratum underneath, or the upper layer may be dominated by conifer trees ranging from small to large trees. There are areas where seedling/sapling trees are dense and overcrowded contributing to excessive ladder fuel levels. There are also areas that have high surface fuel loading. The California Wildlife Habitat Relationship system describes forestland seral stages tree size classes in terms of seedling, sapling, pole, small tree and medium/large tree. Prescription 5 treatment area forested stands are classified by the California Wildlife Habitat Relationship system to fall within size class descriptions ranging from seedling to large tree developing early, mid, Late and mature seral stages.

Density: Chaparral cover density is measured in term of percent canopy closure. Chaparral canopy closure ranges from 60 to 100 percent for the decadent classification. Forest stand cover density is measured in term of percent canopy closure. Forest stand canopy closure ranges from 10 to greater than 60 percent.

As described under the Vegetation Cover Type and Acreage, there is an unbalanced distribution of habitat skewed towards decadent chaparral. In order to provide habitat diversity, the treatment prescription will have the effect of increasing the proportion of younger chaparral stands.

Vegetation Cover Type:
Chaparral: Treatment Prescription 5 would have a direct effect to chaparral cover type through reducing the existing decadent chaparral vegetation and initiating the succession to young chaparral vegetation. The beneficial effect will be an increase in habitat heterogeneity through the development of young seral stage habitat. The effect within the treatment areas will be the development of a mosaic burn severity pattern. Generally, patches of 30-70% mortality are expected. However, the Decadent chamise fields are expected to be more extensively consumed.

Forest: The forested area will have low intensity prescribed burning applied. The low intensity prescribed fire will serve to protect conifer and hardwood overstory trees through ladder and surface fuel reduction. However, where only prescribed fire is applied minimal reduction in stand density will occur. The primary goal is associated with surface fuel reduction. No treatment to upper story vegetation is proposed.

Fuel Conditions Effects: Proposed activities would result in vegetative cover conditions that produce manageable fire behavior. Proposed activities would also make the area more suited for future prescribed fire applications; therefore, progress would be made toward initiating the restoration of ecological processes. The treatment prescription moves all cover type vegetative conditions closer to the desired vegetative conditions which will effect a reduction in mean fire return interval (MFRI).

Size Class: The direct effect to the chaparral vegetation will be the change is size class. Prescribed fire will remove decant chaparral and initiate seedling stage establishment. The direct effect to the forest vegetation type will be limited to reduction of seedling/sapling trees that are less than 10 inches DBH.

Density: Changes to chaparral canopy closure will be short term generally less than three years as vegetation recovers through seedling and sprout regeneration. Chamise-Redshank Chaparral vegetation type is expected to reach a mature shrub seral stage after approximately two years and remain at that stage for an additional 8 years before returning to the decadent shrub stage. Upon reaching the mature shrub stage, canopy closure will return to 60 to 100 percent cover. Montane chaparral will quickly establish a young shrub stage and after five years change to mature stage and remain at that stage for an additional 15 years before returning to the decadent shrub stage. Canopy closure will range from 10 to 24 percent during the young shrub stage before reaching to 60 to 100 cover at the mature stage. However, treatments will increase vegetative diversity and forage quality. Shrubland habitat will have changed from declining forage habitat to a habitat that will present a more palatable degree of forage opportunity. Changes to the forest canopy will be minimal only lower story seedling/sapling trees will have direct treatment.

Acreage: The acreage occupied by post treatment non-forest existing vegetation types is expected to remain the same with only a change to the seral stage. There is no anticipated change to the forested vegetation acreage in terms of vegetation types or seral stage. Treatment effects to this type will be limited to lower story vegetation.

Conclusion: Direct and indirect effects of the proposed action are not considered adverse from a vegetation management perspective, but rather beneficial in developing habitat diversity. Treatment is expected to combine with other project area treatments to reduce the risks of natural disturbances to the Pine Mountain Late Successional Reserve.

Direct and Indirect Effects of Treatment Prescription 6 - Back Fire Fuel Reduction

The treatment consists of using prescribed fire as the primary tool for strategic fuel reduction. The most effective method is to understory and jackpot burn; however, hand piling and chainsaw work may be utilized. The treatment goal is to follow up on the naturally ignited 2008 Back Fire to continue to develop a fire interval that restores and enhances the burned area's ecological function.

Vegetation Cover Type and Seral Stage Acreage

Back Fire Fuel Reduction treatment applies to Units 77 and 79, and the area accounts for approximately 444 acres of the project area within boundaries of the 2008 Back Fire. The Back Fire created a mosaic of burn effects as a result of the variable fire intensity levels. These two units experienced a lower fire intensity which reduce the canopy cover from dense cover greater than or equal to 60 to moderate cover 40 to less than 60 percent.

The California Wildlife Habitat Relationship system describes forestland seral stages tree size classes in terms of seedling, sapling, pole, small tree and medium/large tree. Prescription 6 treatment area forested stands are classified by the California Wildlife Habitat Relationship system to fall within size class descriptions ranging from seedling to larger trees developing early, mid, Late and mature seral stages.Table 27displays the treatment area's vegetation types in terms of California Wildlife Habitat Relationship vegetation types; seral stage; and acreage associated with different vegetation types.

Table 27. Vegetation Types and Treatment Prescription 6 Acreage

Unit Number Seral Stage	CWHR Vegetation TYPE				
	Montane Hardwood Conifer	Montane Hardwood	Ponderosa Pine	Sierran Mixed Conifer	Total Acres
77	**4**	**15**	**42**	**301**	**362**
Early	4	15	28	30	77
Mid				16	16
Late			14	255	269
79				**82**	**82**
Early				1	1
Mid				45	45
Late				36	36
Total	**4**	**15**	**42**	**383**	**444**

Vegetation Structure – Size Class and Density

The treatment area forested habitat is occupied by stands that reflect the Sierran Mixed Conifer vegetation type. Conifer dominated vegetation type makes up 97 percent of the treatment area, and hardwood vegetation types make up only 3 percent. The size class distribution is reflective of the cover type present. Conifer seedling and underbrush have established following the wildfire underneath the overstory canopy. There are also areas that have high surface fuel loading.

Vegetation Cover Type: The forested area will have low intensity prescribed burning applied. The low intensity prescribed fire will serve to protect conifer and hardwood overstory trees. Seedlings and brush species that have develop since the Back Fire will be treated by application of prescribed fire, but the primary goal is associated with surface fuel reduction. No treatment to upper story vegetation is proposed.

Fuel Conditions Effects: Proposed activities would result in vegetative cover conditions that produce manageable fire behavior. Proposed activities would also make the area more suited for future prescribed fire applications; therefore, progress would be made toward initiating the restoration of ecological processes. The treatment prescription moves all cover type vegetative conditions closer to the desired vegetative conditions which will effect a reduction in mean fire return interval (MFRI). Treatment effects will bring these two unit areas closer to a historical fire regime and thus maintaining desired fuels conditions reflective of historical fire regimes.

Size Class: The direct effect to the forest vegetation type will be limited to reduction of seedling/sapling trees that are less than 10 inches DBH.

Density: Changes to the forest canopy will be minimal only lower story seedling/sapling trees will have direct treatment. Burning is expected to reduce the amount of small diameter surface fuel present in treated stands. The application of fire always has potential to kill some larger trees within timbered stands, but mortality is expected to be less than 10% in trees over 16” DBH (which meets the guidelines of the LSRA). Burning is expected to remove some existing snags and logs from the treated stands. However, where prescribed fire is applied the effect will be only minimal reduction in structural habitat. Refer to the Fire and Fuels Report (USDA 2016c) for more information.

Acreage: There is no anticipated change to the forested vegetation acreage in terms of vegetation types or seral stage. Treatment effects to this type will be limited to lower story vegetation or surface fuels.

Conclusion: Direct and indirect effects of the proposed action are not considered adverse from a vegetation management perspective, but rather beneficial in developing late successional habitat diversity. Treatment is expected to combine with other project area treatments to reduce the risks of natural disturbances to the Pine Mountain Late Successional Reserve.

Direct and Indirect Effects of Treatment Prescription 7 - Riparian Reserve Management

Within the riparian reserves treatment area associated with treatment prescriptions 1-6, the appropriate unit-specific prescriptions would be applied with the additional specific protection measure described in Treatment Prescription 7.

The effects of the additional guidelines for Treatment Prescription 1, 2 4, 5, and 6 are as follows:

- SMZ vegetation treated will either be removed from the SMZ or piled in specific location. The effect will be to maintain SMZ natural ground cover, or to reduce pile burning effects by not burning piles. Piles would be left to serve as habitat for prey species.
- No active ignition within SMZ. Burning would be allowed to back down. The treatment effect result lower intensity cooler burning fire with greater potential to develop a mosaic of burned and unburned areas.
- No hand pile burning would occur within 25 feet of the channel high water line. The effect will be a reduce potential for roll out of burning material that could affect lower portion of the SMZ.
- On slopes >60%, slash may be lopped and scattered, and within the lower 10 feet of the SMZ the slash is to be moved upslope >10 feet from the channel high water line. The treatment effect will be a reduced potential for roll out of burning material.

The effects of the additional guidelines for Treatment Prescription 3 are as follows:

- The treatment direct effect will be the exclusion of commercial thinning treatment will within the SMZ. Commercial thinning treatment will only be conducted within the riparian reserve from the SMZ boundary to the outer edge of the riparian reserve.
- Within the inner portion of the riparian reserves referred to as the SMZ portion located from the high water line to 50 feet out only trees less than 10 inches DBH would be thinned from below on 15-25 foot spacing, with leave tree spacing dependent upon tree size and crown diameter. The direct effect will be a reduction in small diameter ladder fuel trees while maintaining the larger diameter tree canopy within the SMZ.
- All tree cutting within the riparian reserve will be directional felled away from the watercourse limiting tree felling operation direct effects to the watercourse.
- Tree removal is limited to conifers. The direct effect is preserving all riparian obligate (near water dependent) vegetation, including within the RRs of seeps, springs, and unstable areas.
- Treatment design standard direct effect will limit ground disturbance within the reserve by limiting operation to slopes less than 35%, and tractor piling to slopes less than 25%.
- Treatment indirect effect will protect SMZ area by not permiting equipment operation within the SMZ. Direct effect is only hand removal (with chainsaws or hand tools) of vegetation within the SMZ is allowed.
- Treatment direct effect is the limitation of ground disturbance by retention 70-75% of existing ground cover (litter/duff) in the SMZ, and 60-65% of existing ground cover (litter/duff/rocks) in the remainder of the riparian reserve. In addition, on slopes >50%, retain 70-75% of existing ground cover (litter/duff/rocks) in the entire riparian reserve.

- Direct effect to canopy cover will be controlled by providing canopy cover retention level consistent with the unit prescription, with a minimum of 50% in intermittent and ephemeral SMZs, and 70% in perennial SMZs.
- The ground disturbance effects will be controlled by treating bare soil areas that exceed 50 square feet with mulch or slash, at the ground cover level appropriate for the slope class, if the area is likely to deliver sediment to a stream.

Cumulative Effect

Direct and indirect effects of the proposed action are not considered adverse, from a vegetation management perspective, but rather beneficial in reducing excess stocking and fire risk. Stand conditions will be more consistent with what would be expected in a historical fire regime. Furthermore, there will be a higher likelihood of sustaining the wildlife habitat characteristics in the event of a wildfire. In addition, the proposed treatments will generally improve tree health, vigor and growth response effectuating resilience to insect and diseases. Thereby, reducing the potential for disturbance based mortality over all.

The geographic area used to analyze the project area cumulative effects of vegetation management treatments covers approximately 10,200 acres. This includes public and private lands within the project area. The analysis area includes 7th field (approx. 3,500-8,000 acres) and 8th field watersheds (approx. 1,500-2,500 acres) see Hydrology report (USDA 2017f). Temporal Bounding of the analysis considers all ground-disturbing activities in the past (up to ten years prior), present, and reasonably foreseeable future. A complete listing of past timber harvest projects within this project area can be clearly seen in the early aerial photos (Refer to Figures 1-6). A total of 7, 537 acres of timber has been harvested from this project area (Refer to Table 6). These acres are a combination of clear cuts (672 acres), partial harvest (5,428 acres), fire salvage (1407 acres), and overstory removal (30 acres). A total of 2757 acres have burned within the project area since 1931 and 1543 during the temporal boundary 20 years (1995-2015) period. Refer to the Fire and Fuels Report (USDA 2016c)

Alternative 2 would improve the distribution of structural attributes over the long-term for species needing older forest habitat for part or all of their life cycle. All resource measurement indicators (Quadratic Mean Diameter andNumber of Trees per acre ≥26” DBH), Canopy Cover, Stand Density Index measurement indicator and Number of trees per acre) demonstrate a positive cumulative effect of enhanced vegetative and late successional habitat with increased fire resiliency.

Several projects have been completed within 2 miles of the project area within the past 20 years or are ongoing and within 2 miles of the project area. There are several other fuels projects that are ongoing to the north and south of the project. (Refer to Figure 17) Thinning around Pine

Mountain Lookout and the Elk Mountain Fuel Break thinning projects are within the project area. The Howard Mill understory burn project is approximately 7000 acres of burning within the Round Fire plantations. It is adjacent to the project area with several units falling within the project area. The Willow Creek thinning project is primarily a pre-commercial thinning and fuels reduction thinning within the Round Fire Plantations. The Horse Mountain Thinning project was a commercial thinning project to the South West of Pine Mountain. The Streeter Ridge thinning project was a precommercial thinning project that lies between Pine Mountain project and Horse Mountain project. The Westshore fuels reduction project is just north of the Pine Mountain project.

Cumulative effects for this project, including past, present and reasonably foreseeable future includes a net benefit overall for stand health and resilience to disturbance within the landscape area. No adverse cumulative effects relating to vegetative resources are anticipated with implementation of Alternative 2. Implementation of Alternative 2 would help mitigate the overstocked condition resulting from past actions and fire suppression.

Alternative 3 No New Temporary Road Construction

This alternative would follow actions proposed in Alternative 2, with the exception of creating a new temporary road. Alternative 3 analysis affects Units 13, 14 and 23.

Direct and Indirect Effects of No New Temporary Road Construction

Direct effects will be the same as Alternative 2 (the proposed action) with the exception of no new temporary road construction. (Construction distance one quarter of a mile.) Instead skid trails will be utilized to access these units. The alternatives replace road construction impacts with the direct effect from increased skid trail distance. The number of landings will be reduced causing a direct effect of increased slash pile size and slash quantities.

Concerning Units 13 and 14, the potential exists that a portion of the commercial treatment area would not be treated because of the longer skidding distances. Unit 23 skidding distances would also increase but to a lesser degree. Not as much of a factor as in Units 13 and14. If treatment does not occur because of lack of road construction, then less than 10” dbh thinning and prescribed fire treatment will be applied. However, this will not reduce tree density in the size of trees that make up a majority of these units. This will result in future >10” dbh trees continuing to fall to the forest floor and greatly increase surface fuel loading. These units have a high density of small to mid-sized >10”dbh trees that over the last several years have been dying and accumulating as surface fuels. Refer to Figure 14. This effect will likely continue and the resulting fuel load will make for high fire intensity and higher mortality.

Cumulative Effects

Cumulative effects would remain the same as in Alternative 2 except that there exists a potential for a lesser cumulative reduction in potential wildlife habitat enhancement and wildfire size as compared to Alternative 2

Alternative 4: No Commercial Thinning in Riparian Reserves

This alternative would follow actions proposed in Alternative 2, with the exception of thinning above 10” DBH in riparian reserves.

Existing Conditions of Riparian Reserves in Pine Mountain assessment was performed to address concerns that Riparian Reserves existing conditions may not represent a compelling need for commercial fuels risk reduction treatments. In order to bolster the initial field assessments made as units were originally selected for treatment, a study was designed to show that Riparian Reserves selected for commercial fuels risk reduction treatments are: (1) compositionally and structurally the same as adjacent Late-Successional Reserve and Matrix stands and (2) that the existing conditions of Riparian Reserves selected for commercial fuels risk reduction treatments would currently carry an active crown fire, and therefore represent a compelling need for risk-reduction treatment.

Effects Analysis Methods

There are many methods for determining whether or not a stand will carry an active crown fire. Some rely on the collection of numerous vegetative, terrain, and weather parameters and then using sophisticated models to simulate fire behavior, however canopy bulk density has been shown to be a strong surrogate for measuring crown fire susceptibility. Stands with a canopy bulk density greater than .1 kg/m^3 have been shown to be susceptible to sustaining active crown fire (Agee 1996, Cram et al. 2003). However, because canopy bulk density is difficult to measure, Keyes and O’Hara 2002 used relative density (percent of maximum SDI) as a proxy for crown fire susceptibility. Powell has taken that an additional step to convert Keyes and O’Hara’s values to additional stand metrics including canopy cover, inter-tree spacing, trees per acre, and basal area (2010). For Douglas-fir stands the threshold for stands that will carry an active crown fire is a basal area of 135 square feet per acre of trees greater than 10 inches in diameter.

To analyze the effects of treating within the riparian reserves, the assessment consisted of three phases: (1) aerial photo comparison, (2) field data collection of basal area, and (3) field photo collection and comparison.

The first phase was measured by mapping Riparian Reserves within commercial fuels risk reduction treatment units. Using aerial photos from 2010, stands within Riparian Reserves were compared with the surrounding commercial fuels risk reduction treatment unit. If the Riparian

Reserve was noticeably less dense, or composed of a non-commercial species, it was classified as not the same as the surrounding commercial fuels risk reduction treatment. If however, the Riparian Reserve's composition and structure were of no noticeable difference, they were classified as the same. Areas classified as not needing treatment were later field verified.
The second and third phases were measured by sampling a subset of Riparian Reserves. The average basal area for the Riparian Reserve was measured and compared to reference values presented by Powell (2010). Photos were taken in each plot comparing the fuels from the inside of the Riparian Reserve to those of the adjacent Matrix and LSR treatment areas. To design the sample, Riparian Reserves were stratified by northern spotted owl habitat type. Since the majority of the habitat is foraging, foraging habitat areas were selected at random until approximately half of the acreage of Riparian Reserves were sampled. Sample plots were taken from a transect paralleling a randomly selected side of the stream course. Sampling locations along the transect were taken every 100 feet for Riparian Reserves less than approximately 500 feet in length, or every 200 feet for Riparian Reserves greater than 500 feet in length. At each sampling location, basal area was sampled using a 20 factor prism or angle gauge at a point 75 feet from the stream (halfway into the Riparian Reserve), and at a point 150 feet from the stream (the outside edge of the Riparian Reserve). Photos were taken at the location 150 feet from the stream pointing towards the Riparian Reserve and away from the Riparian Reserve. In total basal area was measured at 266 points (133 at 75 feet from the stream and 133 at 150 feet from the stream) along twenty-two transects.

Results Phase I

Phase one field verification results, confirmed that approximately 99 percent of the overall Riparian Reserve vegetative conditions are of the same composition and structure as adjacent Treatment Prescription 3 areas located beyond the riparian reserve boundary. Only 1 percent of the overall Riparian Reserve area within commercial fuel risk reduction treatments were shown to have a lower density or to have a non-commercial composition during Phase one.

Results Phase II

On an individual Riparian Reserve basis, some portions of the sampled Riparian Reserves were below Powell's threshold for carrying active crown fire (135 square feet per acre of basal area for trees greater than 10 inches in diameter). For all twenty-two transects only two averaged below the threshold in the middle of the Riparian Reserve (at 75 feet), and five averaged below the threshold on the outside of the Riparian Reserve (at 150 feet 39. One transect averaged below the threshold in both the middle and the outside of the Riparian Reserve.

Results Phase III

Field observations and plot photo analysis substantiate that the units selected for commercial fuel reduction were chosen for their vegetative uniformity and a compelling need for risk reduction treatments. The historic treatments and the suppression of wildfire have similarly affected riparian areas and the adjacent upland treatment areas. The phase one and two assessment of stands confirmed that for the vast majority of Riparian Reserves, the pattern of disturbance (or lack there-of) that has affected stand development is the same across the landscape, both in Riparian Reserves and in the adjacent uplands. Comparison of photos taken as part of Phase III show little to no obligate riparian vegetation, or vegetation types. The photos are dominated with the upland vegetation types.

<u>Direct and Indirect Effects</u>

The overall pattern revealed by the phase two measurements is that on average, basal area sampled at 75 feet (in the middle of the Riparian Reserve) is no different than the basal area sampled at 150 feet (half in the Riparian Reserve and half in the adjacent upland areas), and both of these values exceed Powell's threshold for carrying an active crown fire. The purpose of collecting data from the middle of the Riparian Reserve and at a point half in the Riparian Reserve and half in the adjacent upland area was to determine if there was a difference between the Riparian Reserves and adjacent upland areas. The lack of a difference between the two supports the conclusion that Riparian Reserves are no different, at least in regards to density. Comparing alternative 2 to alternative 4 developed Table 28below. This table displays stand density index values for the units used in the above analysis. Results indicated that stand densities will be reduced in all treatment units. However, Alternative 2 treatment effect is to move 11 out of 12 treatment units' SDI from extreme high density zone to the moderate density zone of Less than full site occupancy. The other treatment unit moves from the extreme high density zone to the high density zone of Full site occupancy. Whereas, the effects of Alternative 4 three units remain within the zone of extreme high density where full site occupancy, where severe competition between trees and active competition-induced mortality is occurring. Eight units move from the extreme high density zone to the high density zone of full site occupancy, and these units fall within upper range of zone which marks the threshold for the onset of density-related mortality. One unit falls within the zone of less than full site occupancy, the density being just slightly less than full site occupancy. One unit falls within upper range of the zone of less than full site occupancy with a density just under that required for full site occupancy. Refer to Table 24 Base Line Stand Density Index, Density Rangecolumn.

Table 28. SDI Comparison Alternative 2 to Alternative 4

Unit	**Existing Condition**	**Post-Harvest Alternative 2**	**Post-Harvest Alternative 4**
	2016	**2018**	**2018**
	SDI	**SDI**	**SDI**
6	**436**	**153**	256

Unit	Existing Condition	Post-Harvest Alternative 2	Post-Harvest Alternative 4
	2016	2018	2018
	SDI	SDI	SDI
7	**746**	**162**	298
8	**548**	**163**	225
12	**756**	**144**	284
13	**433**	**173**	206
14	**493**	**151**	280
15	**456**	**205**	316
16	**701**	**148**	402
18	**486**	**151**	301
24C	**442**	**144**	190
37	**461**	**171**	311
39	**395**	**175**	249

Refer to the Pine Mountain Silviculture Report (USDA 2017b) for more detailed information

Conclusion:

The current stand structure represents high vegetation density for both the basal area indicator and stand density index indicator. As pointed out by Keyes and O'Hara's (2002), stand attributes play a critical role in crown fire susceptibility. The Fire and Fuels Report (USDA 2016c) points out that drainages and their corresponding riparian reserves are typically major fire paths for fires, and it is likely that fires will burn more intensely through the Riparian Reserves. Under this alternative, the Riparian reserves would see more canopy fire (torching and crowning) in most areas than if Alternative 2 were to be chosen. Under Alternative 4, the commercial stands would experience more torching and crown fires than under Alternative 2. The stands would also experience more areas with flame lengths greater than 4 feet than under alternative 2.

In addition, studies have shown that accelerated development of many of the structural components of late-successional stands can be achieved (Oliver 1992, Marshall 1991) through reduced stand density that provide fewer small diameter trees and wider spacing between residual larger diameter trees an effect achieved by Alternative 2 and not by Alternative 4. The effect to late successional habitat is to provide the site condition to develop structural characteristics for late successional species.

Therefore, only treating trees less than or equal to 10 inches DBH (Alternative 4) will not meet the fuel reduction or habitat enhancement purpose and need.

Cumulative effects

Cumulative effects would remain the same as in Alternative 2 except that there would be less of a cumulative reduction in potential wildfire size as compared to Alternative 2, and increased densities have the potential to reduced habitat enchantment within riparian corridors.

Alternative 5 - No Commercial Thinning in NSO Nesting Habitat

This alternative would follow actions proposed in Alternative 2, with the exception of thinning above 10" in known NSO nesting habitat.

Habitat Structural Analysis Trees Per Acre-Diameter Size Class, Stand Density Index, Basal Area, Canopy Cover, Quadratic Mean Diameter, and Trees Greater Than or Equal to 26 Inches DBH.

Alternative 5 effects analysis will focus on habitat structural analysis comparing existing conditions to desired conditions. In addition, to LRMP and LSRA desired condition guidance direction was pursued from the USF&W concern NSO habitat desired condition. USF&W suggested following their directions to private timberland in California's Northern Interior Region where the Pine Mountain Project is located. This document titled "Regulatory and Scientific Basis for U.S. Fish and Wildlife Service Guidance for Evaluation of Take for Northern Spotted Owls on Private Timberlands in California's Northern Interior Region"(USF&W 2008) contains stand metrics needed to avoid habitat impact which would lead to NSO take situation. Refer to Table 4 which presents the minimum requirements for Take Avoidance. These habitat requirement will serve to guide NSO effects analysis. Additional stand metrics are also presented to clarify tree density distribution and species composition. Alternative Comparison shall employ the same standards.

USF&W Indicators

Treatment effects for Alternative 2 and Alternative 5 have been evaluated utilizing the following USF&W Indicators: Trees Greater Than or Equal to 26 Inches DBH per acre, Quadric Mean Diameter per acre, Total Basal Area per acre Indicator, and Percent Canopy Cover per Acre. In addition, Stand Density Index and Tree per Acre will be used.

Trees per Acre-Diameter Size Class Indicator:

Treatment effects for Alternative 2 and Alternative 5 have been evaluated utilizing the following diameter size classes: Total Existing Trees per Acre, Existing Trees per Acre Less than 10" DBH and Existing Trees per Acre Greater than 10" DBH compared to Post treatment values in each diameter size class.

Table 29: Trees per Acre Comparison Alternative 2 to Alternative 5

Unit	Unit Acres	Total Existing Trees per acre	Total post treatment Trees per acre	Existing Trees per Acre Less than 10" DBH	Total Post Treatment Trees per Acre Less than 10" DBH	Existing Trees per Acre Greater than 10" DBH	Post Treatment Trees per Acre Greater than 10" DBH
3A							
Alt_2	12	241	83	159	17	82	66
Alt_5	12	241	110	159	29	82	80
19							
Alt_2	20	144	77	60	0	84	77
Alt_5	20	144	93	60	10	84	83
24B							
Alt_2	9	553	71	459	39	93	32
Alt_5	9	553	124	459	47	93	76
33B							
Alt_2	18	820	175	721	80	98	95
Alt_5	18	820	126	721	40	98	86

Three of the four units Total post treatment Trees per acre, Total Post Treatment Trees per Acre Less than 10" DBH and Treatment Trees per Acre Greater than 10" DBH are greater for Alternative 5. Only Unit 33B is less.

Table 30. Alternative 5 comparison.

Alternative 5	ACRES PER UNIT	Existing Condition	Post-Harvest	Existing Condition	Post-Harvest	Existing Condition	Post-Harvest	Existing Condition	Post-Harvest	Existing Condition	Post-Harvest
		2016	2018	2016	2018	2016	2018	2016	2018	2016	2018
Unit	Acres	Total BA	Total BA	QMD	QMD	TPA ≥ 26	TPA ≥ 26	Canopy	Canopy	SDI	SDI
3A											
Alt_2	12	215	202	13	20	17	18	68	65	357	208

Alt_5	**12**	**215**	**218**	**13**	**19**	**17**	**18**	**68**	**67**	**357**	**243**
19											
Alt_2	**20**	**279**	**254**	**19**	**25**	**34**	**34**	**67**	**60**	**398**	**310**
Alt_5	**20**	**279**	**263**	**19**	**23**	**34**	**34**	**67**	**62**	**398**	**332**
24B											
Alt_2	**9**	**330**	**160**	**10**	**23**	**44**	**32**	**80**	**61**	**595**	**193**
Alt_5	**9**	**330**	**305**	**10**	**21**	**44**	**44**	**80**	**73**	**595**	**348**
33B											
Alt_2	**18**	**219**	**201**	**7**	**15**	**12**	**13**	**81**	**71**	**462**	**162**
Alt_5	**18**	**219**	**179**	**7**	**16**	**12**	**13**	**81**	**66**	**462**	**201**

Alternative 5 post treatment total basal area is greater in three of the four units with unit 33B having a lesser value. Alternative 2 post treatment QMD is greater in three of the four units with unit 33B having a lesser value. Post treatment tress greater than or equal to 26 inches DBH are the same except for Unit 24 B where Alternative 5 has a greater value. Alternative 5 post treatment Canopy is greater in three of the four units with unit 33B having a lesser value. Alternative 5 post treatment stand density index is greater is all units.

Conclusion:
Reviewing Table 29and Table 30**,** the current stand structure represents high vegetation density for all indicators with very little difference between treatments.

Because Alternative 2 can select trees for the understory and overstory Alternative 2 has advantage over alternative 5 in the maintaining stand diversity and health. High density stands that are contributing to mortality of pre-dominate and dominant hardwood and pine trees have been identified as a concern related to species diversity. Therefore the removal of larger diameter trees around hardwoods and pine trees has been identifies as a need in order to enhance or maintain species diversity. Since each alternative treatments effects are so close by the numbers, the advantage of the flexibility of Alternative 2 will help maintain presence of the late successional habitat for longer periods.

This advantage is consistent with studies that have shown that accelerated development and maintenance of many of the structural components of late-successional stands can be achieved (Oliver 1992, Marshall 1991) through reduced stand density that provide fewer small diameter trees and wider spacing between residual larger diameter trees an effect achieved by Alternative 2 and not by Alternative 4. The effect of Alternative two to late successional habitat is to provide the site condition to develop structural characteristics for late successional species to a greater degree than Alternative 5.

Threatened and Endangered Species

Threatened, endangered, proposed or candidate plant, aquatic, and wildlife species that may occur within the Pine Mountain planning area were determined by first consulting the U.S. Fish and Wildlife Service (USFWS) interactive website[1] to obtain a list of species that may occur in Lake County, and then consulting a Forestwide biological assessment and evaluation (BA/BE; USDA Forest Service 2016).

Plants

The US Fish and Wildlife Service's roster of possible listed plant species on the Mendocino National Forest are water howellia (*Howellia aquatilis*) and Keck's checker-mallow (*Sidalcea keckii*).

Water howellia is a small aquatic annual, listed as Threatened. It occurs in the seasonal draw-down zone of small ponds shaded by forest vegetation. This species is threatened by the loss of wetland habitat and habitat changes from timber harvest, livestock grazing, residential development, and competition with introduced plant species. Water howellia historically occurred throughout the Pacific Northwest but it now restricted to specific habitats (Fed Reg 1994). It is currently known on the Mendocino National Forest from seven occurrences on the Covelo Ranger District. There are no occurrences of water howellia in the Pine Mountain proposed treatment units, nor is there any suitable habitat. The closest known occurrences of water howellia are approximately 35 miles north of the proposed project area.

Keck's checker-mallow is an annual forb, listed as Endangered. It is known conclusively only from Tulare and Fresno Counties, where it occurs at low elevations on the grassy, open Sierra foothills (Federal Register, 2003). Plants from Colusa County originally described as *Sidalcea disploscypha* were later annotated as *S.keckii* in 2008 (Hill, 2009). The true identity of the plant is now a matter of debate and awaits resolution through genetic testing. Keck's checker-mallow has never been observed or collected on the Mendocino National Forest. The low-elevation areas of the project area are covered by chaparral and are not suitable habitat for Keck's checker-mallow.

In the absence of habitat for both species, it is determined that this project would not affect water howellia and Keck's checker-mallow; therefore, these species will not be further analyzed.

Aquatics Species

The following species (threatened/endangered/proposed-listing) were considered for analysis:

Chapter 3 **Coho salmon(**Southern Oregon / Northern California Coasts ESU) (*Oncorhynchus kisutch*)

Chapter 4 **Chinook salmon** (California Coastal ESU) (*Oncorhynchus tshawytscha*)

Chapter 5 **Steelhead trout** (Northern California distinct population segment) (*Oncorhynchusmykiss*)

[1] http://www.fws.gov/arcata/specieslist/search.asp

Chapter 6 **Delta smelt** (*Hypomesus transpacificus)**

Chapter 7 **Vernal Pool fairy shrimp** (*Branchinecta lynchi)**

> ***** These species will not be further analyzed because the project is not within the distribution range.

Fish Critical Habitat: The project area is within the distribution range and habitat is present for the SONCC Coho salmon, CC Chinook salmon and the NC Steelhead (Moyle, 2002).

Critical habitat for SONCC Coho salmon has been identified in the project area.

There is no identified critical habitat for CC Chinook salmon or NC Steelhead in the project area.

NOAA Fisheries designated critical habitat for coho salmon on May 5, 1999. For the SONCC coho, critical habitat encompasses coho-accessible reaches of all rivers (including estuaries and tributaries) between Cape Blanco, Oregon and Punta Gorda, California. Critical habitat for steelhead and Chinook was designated on September 2, 2005.

Affected Environment

The Pine Mountain Late-successional Reserve (LSR) Enhancement Project aquatic habitat can be characterized as three watersheds; Bucknell Creek, Benmore Creek and Packsaddle Creek, of which Bucknell Creek and Benmore Creek drain directly into the lower Eel River below Scott Dam (see map, Appendix C). A short section (6.5 miles) of the Eel river also has the potential to be indirectly affected by project activities, the section of the Eel River between the mouth of Bucknell Creek and the mouth of Benmore Creek. Packsaddle Creek drains into the Rice Fork arm of Lake Pillsbury above Scott dam.

The analysis area appears to contain habitat for three fish species listed under the Endangered Species Act: Southern Oregon/Northern California Coast (SONCC) Coho, Northern California (NC) steelhead, and California Coastal (CC) Chinook salmon. This habitat is in Bucknell and Benmore creeks and in the affected reach of the Eel River.

The eastern portion of the project lies in the Packsaddle subwatershed of the Rice Fork 5th field watershed, which drains into Lake Pillsbury and does not contain anadromous fish. Lake Pillsbury, formed by Scott Dam, is a PG&E managed water storage facility for hydroelectric power generation about 12 miles downstream at Van Arsdale. Lake Pillsbury, Rice Fork Creek, and some Rice Fork tributaries provide habitat for resident rainbow trout. Packsaddle Creek is fishless adjacent to the project, but is documented to contain habitat used by the non-native Sacramento pikeminnow near its confluence with Rice Fork Creek.

The western portion of the project lies within the Bucknell and Benmore subwatersheds of the Soda Creek 5th field watershed which is an anadromous watershed. Bucknell Creek and Benmore Creek which flow into the Eel River within the Soda Creek watershed provide designated critical habitat for Southern Oregon/Northern California Coast (SONCC) Coho. Additionally Northern California (NC) steelhead have been documented in both of these streams, but the streams are not currently designated as critical habitat for steelhead. The Eel River also provides designated critical habitat for SONCC Coho and the California Coastal (CC) Chinook salmon. Chinook carcasses and redds have been seen in the past in the lower portions of Bucknell Creek and Benmore Creek, but these tributary streams are not designated Chinook critical habitat. Coho salmon are only rare visitors to the Soda watershed, but it is possible that adult Coho will stray into this watershed and spawn before the project is completed. However, while summer stream temperatures are cool enough for juvenile steelhead, they are higher than those preferred by Coho for juveniles to over-summer.

The headwaters of Packsaddle Creek lie within the project boundaries and this stream is a tributary to Rice Fork. No fish have been documented in Packsaddle Creek adjacent to the project, but nonnative Sacramento pikeminnow have been found in lower Packsaddle Creek and Rice Fork upstream and downstream of the project area. There is no suitable juvenile rearing habitat for western brook lamprey in Packsaddle Creek or the adjacent Rice Fork due to the high stream gradient and insufficient instream fines.

The Eel River below Lake Pillsbury contains the Asian clam (*Corbicula flumenia*) which is a nonnative aquatic invasive species.

Environmental Consequences

Alternative 1 (No Action)

A. Direct and Indirect Effects

Fuels treatments:

Alternative 1 is the "no action" alternative and this means that no fuels treatments would be implemented. No prescribed fire would be performed to reduce fuel loads, which may result in an increase in overall fuel load in the planning area. No hand piles would be built or lit near Benmore Creek allowing fuels to increase in the riparian area. No direct or indirect effects would occur to anadromous fish or their critical habitat from implementation of the "no action" alternative for Fuels treatments.

Alternative 1 is the "no action" alternative and this means the current fuel load would persist into the future. A continued recruitment of fuel would allow the fuel load to increase and elevate the risk of a catastrophic wildfire to occur. A large scale fire with areas of moderate and high severity post-burn conditions could result in significant changes to riparian and stream habitats. These changes include loss of riparian vegetation, loss of canopy cover and the denuding of ground cover that may lead to increased erosion and sedimentation. A high intensity fire in the project area could result in an increase in sedimentation and changes in the riparian habitat that could reduce/not change the habitat suitability for many years (5-10). High severity fires that burn with high temperatures and to a greater extent across the landscape remove vegetative cover and often leave bare mineral soil that is vulnerable to erosion and sedimentation (Arkle and Pilliod, 2010). Compared to the proposed action, the risk of impact to riparian vegetation and instream habitat from a wildfire would be higher because of the continued increase in the fuel load. Implementation of this alternative would not meet project objectives for fuels treatments.

Vegetation Management:

Implementation of the “no action” alternative would result in no direct or indirect effects to anadromous fish or Coho critical habitat. No timber would be removed and no heavy equipment would be used for timber operations; therefore, no direct or indirect effects would occur from vegetation management in the Action Area.

Under the “no action” alternative the timber within the planning area would continue to grow and the stand density would continue to increase, which could increase competition and decrease stand vigor. Implementation of the “no action” alternative would not meet the project objectives for vegetation management.

Road Use and Maintenance:

Implementation of the “no action” alternative would result in no direct or indirect effects to anadromous fish or their critical habitat because no actions would occur and the area would continue under the current OHV and vehicle use.

If the hydrologically connected road segments (HCS) in the project area are not repaired, they will continue to deliver sediment to the streams in the Action Area. This would mainly occur in Benmore Creek and to a lesser extent in Bucknell Creek, based on the existing number of road miles associated with each watershed. Existing gullies and rills would be expected to increase, thereby accelerating sediment delivery to stream channels. Unstable banks associated with failed culverts would not be restored through culvert replacement, and the banks would continue to erode and deliver sediment to the watershed.

A potentially worse outcome is the failure and overtopping of plugged culverts, which could result in the loss of road fill directly into the stream. This type of event can result in a localized reduction in habitat quality as pool volume is reduced and the stream becomes embedded from fine sediment.

<u>Alternative 2</u>

A. Direct and Indirect Effects

Fuels treatments:

Fuels treatments in the Pine Mtn. project area are not directed at excluding fire, but rather at improving landscape resilience to fire events by having fuelbeds that are within the natural range of variability (see proposed action). Approximately 7830 acres (76% of project area) are proposed for prescribed fire treatments (see map appendix A). Thinning of trees may occur in units when necessary to modify fire behavior and assist in holding fire lines.

There would be no ignition of fire in close proximity (300 feet) to Benmore or Bucknell creeks. Prescribed fire is proposed along approximately ½ mile of the north side of Bucknell Creek and 1 ½ miles of the east side of Benmore Creek (see map, Appendix A). Benmore and Bucknell creeks are both steep V-shaped channels with significant inner gorges, which makes work or burn piles occurring near the stream very unlikely.

The following management requirements apply to prescribed fire:

- No direct ignition within 300 feet of perennial streams or 150 feet of intermittent streams, but allow the fire to back into the riparian reserve.
- No handline construction within 100 feet of perennial or intermittent streams, or 50 feet of ephemeral streams, except when there is no alternative to meet objectives.
- Maintain 75% ground cover within 100 feet of perennial streams and within 50 feet of intermittent and ephemeral streams.
- Burn piles will not be built or ignited closer than 50 feet from a perennial stream or 25 feet from intermittent and ephemeral streams.
- Maintain flame lengths of 4 foot at the 90^{th} percentile fire weather conditions.

Prescribed fire is proposed along approximately ½ mile of the north side of Bucknell Creek (11% total length) which is located along the final portion of anadromous habitat. Fire is also proposed to be introduced along the upper 1 ½ mile of the east side of Benmore Creek, mainly above the available anadromous habitat (see map, Appendix A). The desired result of the prescribed fire is a mosaic burn type close to the creek with low burn severity and unburned areas dominating. There may be some localized impacts to individual or groups of riparian trees, but the loss of riparian vegetation is expected to be negligible.

Beche et al., 2005, found that prescribed fire affected only 4.4% of the riparian vegetation even when ignited within the riparian reserve. Arkle and Pilliod, 2010, found no statistically significant change in stream shading from a prescribed fire in which ignition was excluded from the riparian area and where allowed to back into the riparian vegetation. The proposed action requires flame lengths of 4 feet which is less than the 5 foot flame lengths used by Beche et al., 2005. Therefore, it is expected that the effects from the proposed action would be less or similar to what he reported. The effects of prescribed fire on anadromous habitat in Benmore and Bucknell Creek is expected to be negligible.

Prescribed fire actions that could lead to an increase in sedimentation are fireline construction, building and ignition of handpiles and the fire itself. Construction of firelines removes surface vegetation and exposes bare mineral soil, which can lead to erosion and sedimentation. Handlines would not be allowed closer than 100 feet from Benmore and Bucknell Creeks, except under limited circumstances. The lack of treatment within 100 feet would interrupt the connectivity between the fireline and the aquatic feature and assimilate any sediment generated. Also, BMPs would further reduce the risk for excessive sedimentation into the watersheds. Ground cover requirements further minimize the potential sediment created by limiting the amount of bare ground that is vulnerable to erosion. Fire line rehabilitation includes installing waterbars and covering bare ground with leaf litter. This helps limit erosion by reducing the amount of erodible fireline length and increasing ground cover.

No burn piles would be ignited closer than 300 feet from Benmore and Bucknell Creeks. Burn piles occupy a small area (6-10 feet diameter) and the distance from habitat should be adequate to assimilate sediment generated from the erosion of the burnpile footprint. The large V-shaped inner gorges of Benmore and Bucknell creeks should keep burn piles and any firelines construction at least 100 feet from the channel.

Part of this analysis relies on the effective implementation of BMPs. Prescribed fire BMPs were evaluated on the Stanislaus National Forest for their effectiveness in 2006 and 2010. The effectiveness was evaluated on ten separate fires of varying size. Prescribed fire BMPs were found to be effective in minimizing or avoiding impacts to water quality in all ten cases (USDA Forest Service, 2011). Regional BMP monitoring summary also showed an effectiveness rating of 100% for prescribed fire BMPs (USDA Forest Service, 2013b).

High severity fires that burn with high temperatures and to a greater extent across the landscape remove vegetation, cover and often leave bare mineral soil that is vulnerable to erosion (Arkle and Pilliod, 2010). Arkle and Pilliod, 2010, also showed that higher intensity fires can result in increases in sedimentation and also take longer to recover (up to 15 years) from the disturbance. The proposed action would involve a low intensity fire within the Riparian Reserves that is designed to give a mosaic pattern, with unburned areas between the burned areas. The unburned areas and the low intensity burn should retain adequate ground cover to minimize erosion and avoid subsequent sedimentation.

There is some risk that sediment could be delivered to the streams from the burn area but it is expected to be minor, due to the low intensity fire and retention of adequate ground cover (75%) following the burn. Arkle and Pilliod, 2010, found no increases in fine sediment following a prescribed burn when ignition did not occur in the riparian, and the fire was allowed to back into the riparian. Beche et al., 2005, found no statistical difference in fine sediment measures even when ignition occurred in the riparian area. Conditions observed in these two studies are expected to be similar to the prescribed fire outcomes predicted for this project.

There is a low risk of prescribed fire activities delivering fine sediment to the streams in the Action Area; however, it is expected to be minor. Restrictions within SMZs, effectiveness of BMPs, adequate ground cover retention and low intensity fire should further reduce sedimentation from prescribed fire.

There is a chance that a prescribed fire may burn at a higher intensity than is expected and this can cause a reduction in canopy cover. This is expected to occur on a very limited basis where fuel accumulations are high (i.e. “Jackpots”). In these highly localized areas individual or small groups of trees could be killed, but the overall extent is expected to be very limited. With the limited extent of tree mortality the canopy cover is expected to have a negligible change. In units that prescribed fire follows mechanical fuel reduction treatments (thinning, biomass, mastication), the ladder fuels would be removed. The elimination of ladder fuels should help keep the fire on the ground and easier to maintain the 4 foot flame length that is required by the prescription.

Vegetation management:

No mechanical vegetation management activities are proposed to occur near stream channels; therefore no direct effects are expected on anadromous fish from the implementation of the Pine Mountain project. No culverts crossing fish bearing streams are proposed for removal or replacement further reducing the risk of direct effects to fish.

There would be no loss of riparian vegetation in the action area due to the riparian reserve buffers in place and the effectiveness of BMP in relation to timber harvest. The exclusion zone along streams will restrict mechanical equipment from within 50 feet of the streambank which would prevent impacts to riparian vegetation. The management requirement to retain hardwoods should further help protect riparian obligate hardwood species by limiting damage or removal of these species.

Mechanical treatment of general forest is proposed to occur along approximately ½ miles of Benmore Creek (16% of total length). All of the proposed activities are confined to the east side of the drainage. There is a risk of sediment reaching the stream due to ground disturbance from heavy equipment. Rubber tired skidding has the highest potential to cause detrimental ground disturbance because of multiple passes over the same ground. Multiple passes by heavy equipment over the same ground can lead to detrimental soil compaction which has a low filtration rate and can lead to the erosion of bare soil and sedimentation introduce to the watershed. Heavy equipment would not be allowed closer than 50 feet from stream channels which should provide an adequate buffer to intercept and assimilate any sediment produced by vegetation management. This is particularly true on slopes with lower angles (<15%) that typically occur next to the stream. Lowered angled slopes deliver less sediment through a buffer than higher angled slopes (Elliot et al., 2010).

Operation of biomass and mastication equipment has a lower potential for soil compaction and sediment production. This is because they have much lower ground pressure and do not make multiple passes over the same ground. These are generally tracked vehicles which spread their weight out over a larger area and do not cause large areas of bare soil. Further, mastication equipment would spread the shredded material over the ground thereby increasing ground cover and reducing erosion potential. As previously noted, increasing ground cover is an effective way to minimize erosion from vulnerable areas.

Mechanical equipment operations are proposed to occur in two units #50 (8 acres) and #51 (5 acres) on the west side of the headwater of Benmore Creek. These units are located below forest road #18N05 and ¼ mile upslope of Benmore Creek between two intermittent tributaries. The riparian reserve buffers on the tributaries and the distance upslope from the main channel should intercept and assimilate any sediment produced from these units during implementation. To further reduce potential for erosion and sedimentation a ground cover retention requirement of 50% is built into the project design features (hydrology report, pg. 23, USDA 2017f).

General forest and hand thinning could occur along approximately one and a half mile of the east side of Benmore creek (see project map). This may occur on approximately 332 acres in unit #90. This unit has the potential to effect approximately 5000-6000 feet of headwater riparian habitat. The riparian reserve exclusion zone (SMZ) and the effectiveness of BMPs should minimize any impacts to the stream channel and keep sedimentation negligible.

A part of this analysis relies on the effective implementation of BMPs. The Mendocino National Forest evaluated BMPs related to timber harvest for implementation and effectiveness; sites evaluated included skid trails, log deck landings, timber sale administration, streamside management zones, meadow protection and vegetation manipulation (e.g., mastication/shredding). From 2006 to 2010, 76 evaluations were done and 100% were found to be effective for BMPs related to landings, timber sale administration, streamside management zones, meadow protection and vegetation management. Skid trail BMPs were found to be effective at 93% of sites evaluated. Monitoring data from across the entire region was evaluated for the years 2003-2007 and found that BMPs related to timber harvest were effective 96% of the time (USDA, 2013b and USDA Forest Service, 2011). Four National Forests from the Cascades and Sierra Nevada reported that USFS streamside management zone BMPs were effective in preventing sediment from entering streams (Litschert and MacDonald, 2009).

Mechanical equipment operations and hand thinning could reduce general forest canopy while retaining an overall canopy of 70% in Riparian Reserves. As discussed above the current canopy cover in Benmore Creek is 72% (moderate) and Bucknell Creek is 90% (excellent). There could be a short term decrease in riparian canopy resulting in an increase in sunlight reaching the water, which could increase water temperatures. The SMZ exclusion zone, riparian hardwood retention requirements and the riparian reserve retention requirements should minimize water temperature increases.

Road use and maintenance:

The proposed road actions have the potential to affect fish habitat through physical disturbance and sedimentation of habitat. The roads in the project area are typically outside of Riparian Reserves with the exception of stream crossings. Stream crossings are the areas with the highest risk of impacts to anadromous habitat in the project area. The proposed actions for roads would be confined to the existing road prism, especially at stream crossings; therefore, the risk of mortality or injury to individuals would be discountable.

Road treatments are proposed to occur on approximately 30.1 miles of Forest Service roads within the project area and those treatments include: maintenance, reconstruction, decommissioning and road closure (see proposed action). These activities would include road surface repair, maintenance and construction of drainage structures, culvert replacement and cleaning, stabilization features and improving operational access.

Road closure is the process of eliminating access to the road but maintaining drainage features and current road bed. Decommissioning of a road is more of the removal of the road footprint. This involves the removal of all streamcrossings and culverts to include the restoration of channel geometry. This also includes the effective drainage of the road-bed itself by measures such as re-contouring and outsloping to return to near natural hydrologic function. The reshaped road surface should be revegetated with native species or a minimum of 50% ground cover retained (see hydrology report, USDA 2017f).

These actions have the potential to produce short term increases in erosion and subsequent sedimentation because they involve disturbance to the road surface. Sediment from the road prism following maintenance/reconstruction is expected to be the highest in the first two years and then is expected to decrease sharply. Stafford (2011) observed a significant increase in sediment transported to the stream channel for up to two seasons following grading and/or road construction, due to ground disturbance that loosens soil and makes it vulnerable to erosion. The increased sediment should decrease after two years from maintenance of the current road system, installation of drainage features, replacement and cleaning of culverts and remediation of hydrologically connected road segments from the streams. Gravel adds surface cover to the road and holds fine sediment together in a tight matrix that is not readily erodible.

An Erosion Control Plan provides considerations and mitigations for the project to reduce off site erosion. The Erosion Control Plan is required prior to implementation of the Pine Mtn. project, and was completed by the Upper Lake, District Hydrologist in 2015. A complete description of the Erosion Control Plan can be found in the project file, hydrology report (USDA 2017f).

The Pine Mountain Late-successional Reserve Habitat Protection and Enhancement Project has 30.1 miles of roads in the action area. Road treatments are proposed to occur on approximately 19.3 miles of roads that occur within the action area. The remaining 10.8 miles of roads in the action area will remain undisturbed and will not add to the effects of the roads actively used during project implementation. The table below displays the portions of roads that are not planned to be used during project implementation and will not add to the effects on TES species or their designated critical habitat.

Packsaddle creek is above Scott Dam and outside of the action area; therefore, the use of the roads in this watershed will not add to the effects to anadromous habitat. Packsaddle creek watershed contains approximately 13.7 miles of roads. The packsaddle creek roads and the roads which are not planned to be used during project implementation equal a total of 24.5 miles of total road length; therefore, only the remaining 5.6 miles of roads (19% of the total road system) in the project area have the potential to affect anadromous habitat.

Table 31.Roads in anadromous watersheds not planned to be used during project implementation.

Road number	Length of unused portion	Miles of unused road
16N29	16,762 feet	3.17
18N42	3,500 feet	0.66
18N42A	3,830 feet	0.73
18N05D	1020 feet	0.19
18N05J	2,945 feet	0.56
18N05M	2,715 feet	0.51
18N05N	660 feet	0.13
18N05P	2,160 feet	0.41
M8	4,230 feet	0.8
18N37	970 feet	0.18
18N49	2,464 feet	0.47
18N69B	1,992 feet	0.38
18N70	2,460 feet	0.47

17N40A	3,000 feet	0.57
17N35	11,499 feet	2.18
Totals	**57,182 feet**	**10.83**

Part of the analysis of effects relies on the effective implementation of BMPs. Road treatment BMPs would be implemented to ensure adverse impacts to water quality are minimized or avoided. BMPs related to road treatments were evaluated for implementation and effectiveness from 2006 to 2010. Monitoring sites included; stream crossings, slope protection, road surface drainage, decommissioning, construction of temporary roads, control of sidecast material, water source development and management of roads during wet periods. There were 84 sites evaluated and all of them had ratings from 85% to 100% effectiveness, except water source development which was found to be 75% effective (USDA Forest Service, 2011). A regional summary of monitoring data between 2003 and 2007 found an effectiveness rating of 85% for road construction/engineering BMPs (USDA Forest Service, 2013b). The monitoring data demonstrates the effectiveness of regional road treatment BMPs at protecting water quality. Road treatments in the Pine Mtn. project area are expected to result in minor and short term localized increases in erosion and sedimentation.

No designated OHV trails or roads occur in the project area, however, the current level 2 roads in the project area are available for use by OHV. These roads provide access from camp sites to designated OHV trail systems. National and regional BMPs specifically designed for OHV use will be implemented and are part of the project proposed action. The BMPs for OHV should prevent adverse effects to the anadromous habitat due to project implementation.

A road inventory was conducted in 2015 to determine hydrologically connected segments (HCS) of unpaved roads that deliver sediment directly to streams during storm runoff events. The HCS protocol (Frazier and Grant, 2006) identifies HCS for each road and ranks the severity of impact based on the frequency and volume of sediment delivered. The survey identified 23 road segments that were hydrologically connected which totaled 8.86 miles (46,783 feet) of road (see hydrology report, USDA 2017f). The road system in the project area was found to be 29% connected to the watersheds (see hydrology report, USDA 2017f).

One potential water drafting site was identified in connection with anadromous habitat and it is located at the Eel River crossing of the M1 road (see map, Appendix A). The following project design features will apply to water drafting sites:

- Locate water drafting sites to avoid adverse effects to in-stream flow and depletion of pool habitat.
- Streambank and in-channel excavation will be kept to a minimum.
- Use pumps with low entry velocity (350 gpm) to minimize removal of aquatic species.
- Use screening devices on water drafting pumps to avoid juvenile fish removal.

Screen mesh criteria:

Screen mesh must be in good condition and present a sealed positive barrier effectively preventing entry of the “design fish” into the intake. The design fish in this case is an immature (20-30mm) salmon or steelhead fry.
Screen mesh size shall be:

- Round openings – max. 3/32 inch diameter (.09 inch)
- Square openings – max. 3/32 inch diagonal (.09 inch)
- Slotted openings – max. 1/16 inch width (.07 inch)

B. Cumulative Effects

The spatial bounding of the cumulative effects analysis area is restricted to the Action Area. This bounding was chosen because the effects of the proposed actions would be limited in intensity and duration, and would not likely be detectable downstream of the project area. Since the loss of riparian vegetation and loss of canopy cover are only applicable at the level of the treatment unit, their effects would be limited to the project area. There is a slight risk of an increase of sedimentation from some of the proposed actions. However, this risk is relatively small and the observable effects would likely be undetectable downstream of the project area.

The temporal bounding of the cumulative effects analysis area was chosen because the project hydrology report indicated through Cumulative Watershed Effects (CWE) modeling that the effects from this project would not be detectable after ten years.

> In order to understand the contribution of past human actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the cumulative impact of all prior human actions that have affected the environment and might contribute to cumulative effects. This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. By concentrating on existing conditions we are sure to capture all the residual effects of past human actions, regardless of which action contributed those effects.

> The Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.”

The cumulative effects analysis in this (EA or EIS) is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008).
For these reasons, the analysis of past actions in this section is based on existing environmental conditions.

Two continuing actions were identified that could cumulatively add to the adverse effects on aquatic habitat. They are livestock grazing on the Pine Mountain and York Cabin Allotments, and continued OHV use of the road system within the project area.

The project area is within the Pine Mountain and the York Cabin Allotments. The permittees currently operate on these allotments, with 46 head of cattle on York Cabin allotment and 52 head of cattle on Pine Mountain allotment. The permittees work closely with the USFS, Upper Lake Ranger District to regulate the rotation of animals and release their animals in different areas of the allotment separated from south to north. Since allotment use has remained relatively constant, it is assumed that the existing conditions of the streams in the action area represent the combined effects of all past actions and natural factors, including grazing.

Benmore Creek show a lack of riparian vegetation that could be used for browse, with riparian canopy cover running between 46% and 88% with the anadromous reaches showing less than 75% canopy cover. The lack of extensive browse along Benmore Creek suggests that there is little reason for cattle to congregate in the riparian areas, except for water. Given the lack of forage adjacent to the stream and the good quality of available forage in the nearby glades (i.e., Montgomery glade), the effect of livestock grazing relative to sedimentation is expected to be minor and short lived.

The upper reaches of Benmore Creek have steep banks and the stream is confined to a narrow V-shaped canyon. This type of topography makes it very difficult for livestock to gain access to the stream and naturally limits grazing intensity. Since Benmore and Bucknell Creeks are a known water source for cattle, there is some evidence of trailing paths to and from the streams. These paths are considered to have a small impact to the stream channels due to the dense forest in the upland, steep canyon walls, poor access to the channels and a fairly stable stream bank armored with rock.

Cumulatively, livestock grazing on the Pine Mountain and York Cabin Allotments are not expected to contribute to the direct and indirect effects of the proposed action to the extent that would exceed the fine sediment threshold that was identified in the hydrology report (USDA 2017f).

The Pine Mountain area has an extensive OHV trail system that spider webs its way through the action area. The use of this trail system is expected to remain the same as it has been in the past. Currently the system adds a minor amount of sediment to the stream systems from recreational use and trail maintenance.

The Upper Lake Ranger District Hydrologist modeled the cumulative watershed effects (CWE) for the HUC 7 and HUC 8 sub-watersheds in the project area (see hydrology report, USDA 2017f). These sub-watersheds are Benmore, Dashiell, Lower Bucknell, Upper Bucknell, Packsaddle and Willow (see hydrology report, USDA 2017f). The CWE methodology uses constant features and past, ongoing and future land management actions to evaluate equivalent roaded area (ERA).

The ERA assigned to the past, ongoing and future actions are compared to a threshold established for the watershed of concern. If the threshold is exceeded or closely approached the cumulative effects of all actions may begin to result in channel alteration. These alterations could cause stream bank instability and channel incision, which may result in erosion and sedimentation to the watershed. If detrimental alterations occur, it would be assumed that essential habitat elements required by anadromous fish may also be adversely affected. Conversely, if the threshold for watershed effects is not exceeded or remains below the threshold, there is very little risk that the habitat would be adversely affected.

Table 32. 7th field CWE analysis %ERA values, Threshold of Concern (TOC) is 12%.

Watershed	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Upper Bucknell Cr.	1.48	2.32	2.32	2.13	2.32
Lower Bucknell Cr.	1.23	2.28	2.28	2.15	2.28
Benmore Cr.	4.14	7.75	7.74	5.99	7.56

The ERA values for all of the sub-watersheds in the cumulative effects analysis area were calculated well below the threshold of concern. Most sub-watersheds showed a spike in ERA values after project implementation, but remained well below the established threshold of concern. The ERA analysis values for all of the sub-watersheds are expected to return to pre-project levels within ten years (see hydrology report, USDA 2017f).

Alternative 3

A. **Direct and Indirect Effects**

Fuels treatment:

The proposed fuel treatment actions for this alternative are identical to the proposed action (Alternative 2); therefore, the direct and indirect effects of this alternative are the same as those for the proposed action.

Vegetation management:

The proposed vegetation management actions for this alternative are identical to the proposed action (Alternative 2); therefore, the direct and indirect effects of this alternative are the same as those for the proposed action.

Road use and maintenance:

The proposed actions for roads under Alternative 3 is essentially the same as the proposed action (Alternative 2); with the exception of no new temporary road construction in Bucknell Creek. The proposed road segment is ¼ mile long (1320 feet) and is located in Bucknell Creek watershed, within the Action Area. The reduced road work should result in a large reduction in ground disturbance and less sediment delivered to streams, when compared to the proposed action. The reduction in ground disturbance and sedimentation should make this alternative slightly more beneficial to anadromous fish and their critical habitat, when compared to the proposed action.

B. **Cumulative Effects**

Cumulative effects for this alternative are the same as in the proposed action (Alternative 2), with the exception of the Benmore Creek watershed. The hydrology report (USDA 2017f) showed that without the creation of new temporary roads in Benmore Creek that the ERA reduced from 11.53 to 11.51, which is a fairly insignificant difference. The changes in anticipated cumulative effects are so small that the cumulative effects should be similar to those in the proposed action (Alternative 2).

<u>Alternative 4</u>

A. **Direct and Indirect Effects**

Fuels treatment:

The proposed fuel treatment actions for this alternative are identical to the proposed action (Alternative 2); therefore, the direct and indirect effects of this alternative are the same as those for the proposed action.

Vegetation management:

The difference between this alternative and the proposed action is the removal of logging equipment for log removal in the riparian reserve. The action area is confined to Benmore and Bucknell Creeks, which have no log removal proposed in near stream habitat; therefore, the difference in effects between this alternative and the proposed action is insignificant. Since the difference is insignificant the direct and indirect effects for this alternative are the same as the proposed action (Alternative 2).

Road use and maintenance:

The proposed road use and road maintenance actions for this alternative are identical to the proposed action (Alternative 2); therefore, the direct and indirect effects of this alternative are the same as those for the proposed action.

B. **Cumulative Effects**

Overall differences in effects between this alternative and the proposed action are so small, that the cumulative effects should be similar. The cumulative effects for this alternative should be the same as the proposed action (Alternative 2).

<u>Alternative 5</u>

A. **Direct and Indirect Effects**

Fuels treatment:

The proposed fuel treatment actions for this alternative are identical to the proposed action (Alternative 2); therefore, the direct and indirect effects of this alternative are the same as those for the proposed action.

Vegetation management:

The changes in alternative 5, when compared to the proposed action (Alternative 2), occur outside of the riparian and away from stream habitat; therefore, the direct and indirect effects are the same for this alternative as they are for the proposed action (Alternative 2).

Road use and maintenance:

The proposed road use and road maintenance actions for this alternative are identical to the proposed action (Alternative 2); therefore, the direct and indirect effects of this alternative are the same as those for the proposed action.

B. Cumulative Effects

Overall differences in effects between this alternative and the proposed action are so small, that the cumulative effects should be similar. The cumulative effects for this alternative should be the same as the proposed action (Alternative 2).

Wildlife

The following federally listed species are suspected to occur in the project area: northern spotted owl (threatened).

Presence or absence of wildlife species in the project area is based on the known range of each species, habitat suitability, records in the Mendocino National Forest Wildlife Sighting Database (NRIS), the Forest's Geographic Information System (GIS) vegetation and wildlife species layers and incidental observations and surveys.

The northern spotted owl is the only federally listed species analyzed. The determination from the biological assessment is: **The Pine Mountain Project may affect but is not likely to adversely affect the northern spotted owl, and it may affect but is not likely to adversely affect northern spotted owlcritical habitat.**

On June 28, 2011, the FWS released the "Revised Recovery Plan for the Northern Spotted Owl *(Strix occidentalis caurina)*." The purpose of the recovery plans is to describe reasonable actions and criteria that are considered necessary to recover a listed species. The 2011 recovery plan represents the "best available science." This project has taken special steps to be consistent with the recovery actions with the 2011 Revised Recovery Plan.

The 2011 Recovery Plan recognizes the importance of maintaining, and restoring, habitat for the recovery and long-term survival of the spotted owl. The 2011 Recovery Plan relies on Federal lands to provide the major contribution for recovery (USDI Fish and Wildlife Service 2011).

Affected Environment- Northern Spotted Owl and Critical Habitat

The Late Successional Reserve Assessment describes the late successional conifer and hardwood-conifer habitat as being distributed along the northern and eastern aspects of stream corridors. The LSRA identifies 5,879 acres of the LSR that is currently providing late successional habitat scattered throughout the LSR and 9,042 acres that could potentially support late successional habitat, without stand replacement disturbances. Although the LSRA identifies almost 6,000 acres as being available as late successional habitat within the Pine Mountain LSR, in reality, that number may actually be much smaller. According to data from California Wildlife Habitat Relationship vegetation types the Pine Mountain project area contains 726 acres of late seral Montane Hardwood-Conifer, 479 acres of late seral Montane Hardwood, 1947 acres of late seral Sierran Mixed Conifer, and 2,264 acres of mature seral Sierran Mixed Conifer (Silviculture report, USDA 2017b).

According to the LSRA (USDA 2000) there are 3,615 acres of foraging and 2,464 acres of nesting habitat that is scattered throughout the LSR, concentrated along stream courses, and on north and east facing slopes that is suitable for northern spotted owls. There is an additional 2,963 acres that is considered capable to provide suitable habitat in the future. At the time the LSRA was written there were eight activity centers within the Pine Mountain LSR and all eight of those are within the Action Area of Pine Mountain project. Based on the Mendocino's NSO habitat layer that takes into consideration ground trothed treatment areas there is 6,075 acres of NSO habitat within the project area, 1,837 of nesting and roosting, 2,394 acres of foraging, and 1,844 acres of dispersal.

Northern spotted owls have been observed utilizing Douglas-fir, western hemlock, grand fir, white fir, ponderosa pine, Shasta red fir, mixed evergreen, mixed conifer hardwood, and redwood forest types (USFWS 2011). The Pine Mountain project area contains Douglas-fir, ponderosa pine, and mixed conifer hardwood forest types that the owl may use as well as blue oak-foothill pine, blue oak woodland, coastal oak woodland, closed-cone pine-cypress, and montane hardwood forest types, according the California Wildlife Habitat Relationship (CWHR).

Spotted owls typically use older forest habitats that contain the structures and characteristics for nesting, roosting, and foraging. These characteristics include high canopy closure (60-90%), a multi-layered, multi-species canopy with large overstory trees (DBH > 30"), a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections, and other evidence of decadence), large snags, large accumulations of fallen trees, and other woody debris on the ground, and sufficient open space below the canopy for owls to fly (USFWS 2011).

Foraging habitat will have similar characteristics as nesting and roosting but it may not always support a successfully nesting pairs of owls. Dispersal habitat usually consists of habitat of adequate tree size and canopy closure to provide protection from predators and minimal foraging opportunities. Small amounts of fragmented habitat does not seem to hinder spotted owl dispersal, but large fragmentation, such as the Willamette Valley, is a natural barrier to dispersing spotted owls (USFWS 2011).

Habitat that supports the transient stage of dispersing juveniles contains stands with adequate tree size and canopy cover to provide protection from avian predators and minimal foraging opportunities. This habitat may include younger and less diverse stands than foraging habitat, such as even-aged, pole-sized stands, but these stands should contain some roosting structures and foraging habitat to allow for temporary resting and feeding during this phase as this a vulnerable stage for dispersing juveniles (USFWS 2011).

Nesting and roosting habitat is patchy across the landscape and not well connected by functional habitat, either foraging or dispersal.

Northern Spotted Owl Critical Habitat

There is designated critical habitat for the northern spotted owl within the Pine Mountain project area. The critical habitat within the project area is a part of the subunit ICC 5. Within the Action Area (a 1.3 mile analysis area around the project boundary, about 30,000 acres) there is 12,123 acres of critical habitat and there is 8,284 acres of critical habitat in the project area. There are 6,857 acres of critical habitat that will receive at least one type of treatment. Of those 6,857 acres, 915 acres will receive fuel break treatment, 5264 acres will receive some sort of fuels treatment, and 1516 acres will receive a treatment type of greater than 10” thinning. The fuel break overlaps with fuels and thinning treatments making the acres treated seem larger than what is on the ground.

Table 33. Acres of designated critical habitat receiving treatment in the Pine Mountain Late Successional Reserve Habitat Enhancement and Protection project and the percentage of those acres in relation to Critical Habitat

Treatment	Acres	% ICC5	% AA	% PA
ICC5	34930			
Action Area	29940	86%		
Project area	10200	29%	34%	
Fuel Break	145	<1%	<1%	1%
Fuels treatments	6153	15%	18%	60%
>10” Thin	1702	5%	7%	17%
No treatment (in PA)	2200	6%	7%	22%

On December 4, 2012, the U.S. Fish and Wildlife Service published the Final 2012 Northern Spotted Owl Critical Habitat rule (77 Fed Reg. 71876-72068) under the Endangered Species Act. Critical Habitat consists of those areas which have “physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection.” 16 U.S.C. § 1532(5)(A). In total, approximately 9,577,969 acres (ac) (3,876,064 hectares (ha)) in 11 units and 60 subunits in California, Oregon, and Washington fall within the boundaries of the Critical Habitat designation. The rule became effective on January 3, 2013. This project is entirely within 2012 Critical Habitat for the northern spotted owl.

Northern Spotted Owl Status within the Pine Mountain Planning Area

There are no recent surveys for the Northern spotted owl within the Pine Mountain Late-Successional Reserve that meet the standards in the Recovery Plan (2011) survey protocol. Surveys to protocol are being conducted concurrently with the development of the Pine Mountain EIS.

In the late 1970’s three Spotted Owl Habitat Areas (SOHAs) were established in the Pine Mountain LSR and all or portions of the SOHAs were surveyed from 1978-1990. Spotted Owl Habitat Areas are 1000 – 3000 acres of habitat set aside for an interacting network of northern spotted owls. One Random Sample Area (RSA) was established and surveyed from 1989-1990. Random Sample Areas are 1000 acre circles around a random point that is visited each year to determine if an owl or pairs are present and if they are breeding (Thomas et al. 1990). Between 1993 and 1995, as various management actions were implemented, the area was surveyed to Regional Protocol from the Recovery Plan for the owl written by the US Fish and Wildlife Service. An estimated 80-100% of the suitable and potentially suitable habitat has been surveyed.

Spotted Owl Habitat Areas were replaced by Habitat Conservation Areas (HCAs) based in the Interagency Scientific Committee (ISC) Report. Habitat Conservation Areas are contiguous blocks of habitat to be managed and conserved for spotted owls and they protect larger areas of land than SOHAs previously protected. HCAs may support about 20 pairs, less than 20 pairs, or is habitat for dispersal and future nesting. The intent of the HCAs is to assure population viability, maintain distribution, enhance habitat conditions, reverse adverse situations, and hedge against catastrophic loss (Thomas et al. 1990).The Pine Mountain LSR was designated as a Category 2 HCA (block of habitat to support 2 to 19 pairs) based on The Rule Set found on page 28 of ISC Report, and was surveyed in 1992 (USDA Forest Service, 2000).

In 1994, the area was re-designated to Late-Successional Reserve RC312 and the Final Draft Recovery Plan for NSO incorporated this area into Critical Habitat Unit 44, an area that encompasses all three portions of the LSR but not the areas in-between, the matrix land (USDA Forest Service, 2000). Critical Habitat Units (CHU) are areas composed of the physical and biological features essential to the conservation of the species. Under the 2012 Designation of Revised Critical Habitat for the Northern Spotted Owl there is 941, 568 acres of Critical habitat within the Inner California Coast Ranges out of a total of 9,577,969 acres in California, Oregon, and Washington.

Table 34shows the survey results for the activity centers within the Pine Mountain LSR. This survey data shows that the LSR has met the requirement in the ISC Report of at least two pairs of owls but the area has not been recently surveyed and it is unknown if this is still the case. One pair of non-reproducing, territorial owls were found during 2016 protocol surveys and a single owl was located in an old activity center.

Table 34. Northern spotted owl survey results for the Pine Mountain LSR from the Forest-Wide Late Successional Reserve Assessment (2000)

Activity center	Years surveyed	Survey Results
4014	NA	Nesting
	1987	Pairs
	1990, 92, & 94	Singles
	1988, 89, 91, & 95	Negative
4015	NA	Nesting
	1989	Pairs
	1986, 87, 88, 90, 91, & 94	Singles
	1981, 82, 85, & 92	Negative
4017	1983, 86, 88, 90, & 92	Nesting

Activity center	Years surveyed	Survey Results
	1978, 81, 82, 85, 89, & 91	Pairs
	1987	Singles
	NA	Negative
4024	1992	Nesting
	1986	Pairs
	1994	Singles
	NA	Negative
4033	NA	Nesting
	NA	Pairs
	1986, 90, 92, & 94	Singles
	1981, 87, 88, 89, & 91	Negative
4039	NA	Nesting
	NA	Pairs
	1994	Singles
	1990 & 92	Negative
4044	NA	Nesting
	1992	Pairs
	1986 & 94	Singles
	NA	Negative
4047	NA	Nesting
	1987 & 92	Pairs
	1986, 88, & 94	Singles
	1982, 89, & 90	Negative

In 2011, NSO surveys were conducted for the South Ridge Prescribed Burn project using the 2011 US Fish & Wildlife Survey Protocol. The South Ridge prescribed burn project is located west of Lake Pillsbury along County Road 301, with roads 18N35 and 18N24 used as possible holding lines. Call points for this project are located along 18N35, M1, and 18N24. Call Points along County Road 301 and 18N24 fall within the Action Area for Pine Mountain LSR Habitat Protection and Enhancement Project. There were no northern spotted owls detected during these surveys but barred owls and western screech owls were detected.

Surveys for the Pine Mountain LSR Habitat Protection and Enhancement Project were conducted in 2016 and will be conducted in 2017 to the 2011 Survey Protocol. Analysis for this Biological Evaluation will be assuming presence of northern spotted owls in all suitable habitat since protocol surveys are not completed.

Prey Species

A main prey source for northern spotted owls on the Mendocino is the dusky-footed woodrat. The woodrat inhabits areas with thick underbrush and cover near small streams or other sources of water (Bonadio 2000, ADW 2017). Sakai and Noon (1993) found that woodrats were at their highest densities in sapling/brushy pole timber stands followed by seedling/shrubs and large old-growth stands in Northwestern California forests. Where woodrats cross ecotones is most likely where they become prey for northern spotted owl.

Treatments may remove some denser stands of smaller trees and brush that may be inhabited by dusky-footed woodrats. Chaparral units, where woodrats may be most abundant, will receive strategic fuels reduction to break up the continuity but should also stimulate regeneration of chaparral and contribute to the diversity of seral stages. Burning would be applied so that not all of the chaparral may see fire. This will create refuge for woodrats that may become displaced due to activity in the area.
Woodrats have been observed near the Pine Mountain lookout and several nests were seen along the east side of Packsaddle Creek during a follow-up outing in 2016.

Other prey sources include deer mice, tree voles, red-backed voles, gophers, snowshoe hare, bushy-tailed wood rats, birds and insects (depending on location).

Threats to Northern Spotted Owl

Barredowl

A threat to northern spotted owl is the barred owl. Barred owls are known to occur within the Pine Mountain LSR and the action area of the Pine Mountain project. Barred owls were detected during the South Ridge surveys in 2011 and were heard by Archeologist Bob Weaver at Pine Mountain lookout, incidentally. Barred owls were detected within the Pine Mountain project area during 2016 protocol NSO surveys. More information on the locations of barred owls will be available after the second year of surveys in 2017.

Fire

The 2011 NSO Recovery Plan identifies stand-replacing wildfire as one of the three top threats to the recovery of species stating “currently the primary source of habitat loss is catastrophic wildfire ….” The Recovery Plan further notes that wildfire size and frequency have been increasing in the western US and that acres burned are expected to continue to increase due to climate changes and past land management practices. This overall increase in acres burned translates to a corresponding increase in the acres of spotted owl habitat lost to fire.

Environmental Consequences

Designated Critical Habitat

Alternative 1 – No Action

The northern spotted owl and its habitat would not be directly affected by the No Action alternative however indirect effects include the loss of nesting and foraging habitat. Although stands of mature coniferous forests may continue to advance in the short term as well as the creation of snags and dead and down material, they will eventually be lost to natural disturbances. Without treatment in the planning area, areas of early to mid-seral habitat are not created or maintained to become mature conifer stands to provide nesting habitat in the future. Diversity of the understory will be lost as the canopy continues to close. Without the treatment there is also the increasing risk of losing habitat to stand replacing wildfires or other natural disturbances. Average fire activity across all treatments right now is 30% surface, 50% torching, and 20% crown fire.

Alternative 2 – Proposed Action

Direct effects on Nesting/Roosting Habitat

Treatment Prescription 1, 2, 4, 5, & 6

Treatment prescription 1, 2, 4, 5, & 6 will not have any direct effects on northern spotted owl nesting and roosting habitat.

Treatment Prescription 3 –Ecological Fuel Reduction Treatment - Commercial Thinning

Treatment prescription 3 treats about 60 acres of northern spotted owl nesting and roosting habitat. The treatment units are along ridgetops and upper slopes.

This treatment is designed to promote and sustain late successional habitat by focusing tree retention on trees that provide habitat with structural diversity preferred by late successional species. This will be accomplished by thinning from below (subdominant trees) with a variable retention objective. This will reduce density by increasing space between the leave trees the make up the lower canopy and the upper canopy. Now ladder fuels are reduced, the stand height to crown base is raised, and crowns of the upperstory and understory are separated which all reduce the risk of torching and crown fire. There may be minor removal of codominant trees that help provide the canopy structure characteristic for suitable NSO and late successional habitat. Variable density thinning is used to create, sustain, or restore spatial, structural, and compositional heterogeneity in a stand. This thinning is a modification of thin below which usually results in a uniform stand structure.

After treatment all units will maintain their designation of northern spotted owl habitat. There will be no downgrading or removal of nesting and roosting habitat. The private land guidelines developed by US Fish and Wildlife Service (Appendix X) were used to ensure the treatments maintained northern spotted owl habitat. Nesting and roosting units will have a basal area maintained at 160 ft^2 or greater, a QMD at 15” or greater, trees per acre >26” DBH will be maintained at 14 or greater, and canopy cover will not be reduced below 60% post-harvest.

It is natural for stands to fluctuate in BA, QMD, TPA, and canopy cover therefore falling in and out of high quality habitat, but maintaining nesting and roosting characteristics. It was identified in the Upper Eel River Watershed Analysis that fires that in the past had led to large-scale disturbances in this watershed have contributed to the fragmentation and loss of forested habitat to an extent that would have effected northern spotted owls. Therefore, it is important to treat this habitat to prepare it for naturally ignited or human caused wildfires so that the fire is beneficial to the habitat and not detrimental and stand replacing which could potentially downgrade or remove the nesting and roosting habitat.

Treatment Prescription 7 – Riparian Reserve Management

Treatment Prescription 7 applies the Minimal Management RX 4 from the Mendocino LRMP to treatments within riparian reserves and streamside management zones. There are a couple guidelines that directly impact northern spotted owl nesting and roosting habitat:

Within the SMZ, only trees <10” DBH would be thinning from below on 15-25 foot spacing, with leave tree spacing dependent upon tree size and crown diameter

Retain canopy cover consistent with the unit prescription with a minimum of 50% in intermittent and ephemeral SMZs and 70% in perennial SMZs

These guidelines maintain nesting and roosting habitat for Treatment Prescription 3.

Indirect Effects on Nesting and Roosting Habitat
The proposed action, Alternative 2, will reduce fire risk and improve forest health. Under this alternative the potential for crown fire and torching decreases (Table 35). These changes in fire behavior will indirectly benefit northern spotted owl nesting and roosting habitat by moving it closer to historical fire return intervals and returning resiliency to the landscape.

Table 35. Average CFA across the Pine Mountain project area

Alternative 1 – No Action			Alternative 2 – Proposed Action		
Surface	**Crown**	**Torch**	**Surface**	**Crown**	**Torch**
30%	50%	20%	83%	11%	6%

Treatment Prescription 1 – Ecological Fuel Reduction Treatment - Plantation Areas
Treatment prescription 1 reduces tree density and competition to stimulate early successional plantations and promote successional stage development. Plantations do not currently function as nesting and roosting habitat for northern spotted owls since most of the trees are of smaller diameter and stands are homogenous. By focusing retention on the trees within the upper end of the diameter range development of the stands into mid and late successional habitat is expedited. Treatments also improve stand vigor and resistance to insects and disease, drought, and wildfire. Treatments also reduce the chance of a fire entering the crown and decrease flame lengths (Table 36) by removing smaller trees and increasing canopy base height.

Although this treatment does change the successional stage immediately post treatment it is expected to protect the habitat from uncharacteristic wildfire so that the stand is able to grow into those later successional stages.

Table 36. CFA and flame lengths comparing No Action and post Proposed Action within plantation areas

	Crown Fire Activity			Flame Lengths			
	Surface	**Torching**	**Crown**	**0-4**	**4-8**	**8-11**	**11+**
Alternative 1 – No Action	35%	43%	22%	22%	5%	1%	72%
Alternative 2 – Proposed Action	76%	12%	12%	70%	6%	1%	23%

Treatment Prescription 2 – Ecological Fuel Reduction Treatment - Naturally Forested Areas
Like Treatment prescription 1, treatment prescription 2 treats trees <10” DBH with the exception of removing trees up to 20” DBH around individual conifers and hardwoods. This treatment reduces the chance of wildfire scorching or burning the canopy of a stand.

Treatments raise the average canopy base height and reduce density. This indirectly affects nesting and roosting habitat by preparing it to carry beneficial wildfire and allowing the trees to grow into late successional habitat at an expedited rate than if left to its own devices. After treatment the stands chances of a surface fire increase while crown fire is reduced (Table 37).

Table 37. CFA and flame lengths comparing No Action and post Proposed Action within naturally forested areas

	Crown Fire Activity			**Flame Lengths**			
	Surface	**Torching**	**Crown**	**0-4**	**4-8**	**8-11**	**11+**
Alternative 1 – No Action	27%	43%	30%	21%	3%	1%	75%
Alternative 2 – Proposed Action	84%	8%	7%	83%	4%	0%	12%

<u>Treatment Prescription 3 –Ecological Fuel Reduction Treatment - Commercial Thinning</u>
Treatment prescription 3 indirectly effects nesting and roosting habitat by preparing the landscape for and protecting it from uncharacteristic wildfire (Table 38). By removing larger trees commercially it would reduce the amount of canopy fuels therefore reducing the chance of a fire being carried through the crowns and causing mortality of the larger trees. Treatment will also raise the average canopy base height reducing the chances of a fire even entering the crowns of the trees in the first place. As seen in Table 38, a majority of flame lengths are less than 4 feet which leads to the increase in surface fire and the decrease in crown fires.

Table 38. CFA and Flame lengths comparing No Action and post Proposed Action within the commercial units

	Crown Fire Activity			**Flame Lengths**			
	Surface	**Torching**	**Crown**	**0-4**	**4-8**	**8-11**	**11+**
Alternative 1 – No Action	18%	49%	33%	22%	1%	0%	76%
Alternative 2 – Proposed Action	92%	4%	5%	92%	1%	0%	7%

<u>Treatment Prescription 4 – Ecological Fuel Reduction Treatment - Shaded Fuel Break</u>
The shaded fuel break indirectly effects northern spotted owl nesting and roosting habitat by providing a break in fuel continuity which can protect surrounding habitat. It would not remove trees >10” DBH and would only be 500 feet in width where it does not overlap with other treatments (145 acres mostly in chaparral). This fuel break would protect habitat in the Pine Mountain LSR from fire and aid in prescribed fire control and application. Post treatment CFA and flame lengths would be the same as treatments in naturally forested areas (Table 37).

<u>Treatment Prescription 5 – Ecological Fuel Reduction Treatment - Chaparral Management</u>
Chaparral management indirectly effects northern spotted owl nesting and roosting habitat by reducing fuel continuity and protecting surrounding habitat from uncharacteristic wildfire.

<u>Treatment Prescription 6 – Ecological Fuel Reduction Treatment - Back Fire Fuel Reduction</u>
There are 504 acres of nesting and roosting habitat within the Back Fire perimeter (1500 acres). The Back Fire burned at low to moderate severities and created a mosaic of burn effects. After initial mortality trees have continued to die and fall within the fire perimeter. This has created

elevated levels of larger fuel on the ground that could lead to higher fire intensities and residence times (burning in one place for a longer period of time) which could have greater impacts on surrounding vegetation and soil. Current surface fuel loading is moderate to high but as more time goes by more trees fall and add to that fuel load. This treatment will reduce surface fuel loading, reduce tree density, and maintain a fire return interval which will protect the habitat within and surrounding the Back Fire area.

Treatment Prescription 7 – Riparian reserve Management

Treatment Prescription 7 applies the Minimal Management RX 4 from the Mendocino LRMP to treatments within riparian reserves and streamside management zones. There are a couple guidelines that directly impact northern spotted owl nesting and roosting habitat:

- Within the SMZ, only trees <10” DBH would be thinning from below on 15-25 foot spacing, with leave tree spacing dependent upon tree size and crown diameter
- Retain canopy cover consistent with the unit prescription with a minimum of 50% in intermittent and ephemeral SMZs and 70% in perennial SMZs

These guidelines maintain nesting and roosting habitat for Treatment Prescription 3.

Direct Effects on Foraging Habitat

Treatment Prescription 1 – Ecological Fuel Reduction Treatment - Plantation Areas

Treatment prescription 1 will not have any direct effects on northern spotted owl foraging habitat. Plantations do not function as foraging habitat due to the smaller size of the trees and the lack of trees greater than 26” DBH and the uniformity of the stands.

Treatment Prescription 2 – Ecological Fuel Reduction Treatment - Naturally Forested Areas

Treatment prescription 2 will have a direct on foraging habitat by increasing QMD by removing the smaller trees from the stand (Table 9) moving several stands from low quality foraging into a higher quality of habitat. Although this treatment may remove trees 10-20” DBH around individual conifers and hardwoods, all of the stands that receive this treatment maintain foraging habitat and some reach nesting and roosting post-fire treatments. Canopy cover will not be reduced below 40% since all trees removed will be subdominant and not likely contributing to the overstory.

Treatment Prescription 3 – Ecological Fuel Reduction Treatment - Commercial Thinning

Treatment prescription 3 treats about 1560 acres of foraging habitat. These treatments are along ridgetops and upper slopes and were once nesting stands but due to the density and suppression within the stands they have downgraded to foraging.

This treatment is designed to promote and sustain late successional habitat by focusing retention on trees that provide habitat with structural diversity preferred by late successional species. This will be accomplished by thinning from below (subdominant trees) with a variable retention objective. This will reduce density by increasing space between the leave trees that make up the lower canopy and the upper canopy. Now ladder fuels are reduced, the stand height to crown base is raised, and crowns of the upperstory and understory are separated which all reduce the risk of torching and crown fire. There may be minor removal of codominant trees that help provide the canopy structure characteristic for suitable NSO and late successional habitat. Variable density thinning is used to create, sustain, or restore spatial, structural, and compositional heterogeneity in a stand. This thinning is a modification of thin below which usually results in a uniform stand structure.

After treatment all units will maintain their designation of northern spotted owl foraging habitat or develop into nesting and roosting habitat. There will be no downgrading or removal of habitat. The private land guidelines developed by US Fish and Wildlife Service were used to ensure the treatments maintained northern spotted owl habitat. There are seven units that will meet nesting and roosting habitat requirements post-harvest. The primary characteristic that is increased is QMD which moves these stands into nesting and roosting habitat. There are three units that end up meeting nesting and roosting requirements after second simulated prescribed fire. This is due to the increase in canopy cover that has developed due to the release of suppressed trees allowing them access to nutrients and space to grow. Over time other stands move in and out of nesting and roosting, and some even into high quality nesting and roosting.

Treatment prescription 3 is beneficial to foraging habitat, as long as maintenance burns occur regularly. In the case that maintenance burns cannot be completed the initial harvest and prescribed burn could prepare the landscape to carry a beneficial fire by reducing stand density and raising the crown base height. It is natural for stands to fluctuate in BA, QMD, TPA, and canopy cover therefore falling in and out of nesting and roosting, but maintaining foraging characteristics. It is important to treat this habitat to prepare it for naturally ignited or human caused wildfires so that the fire is beneficial to the habitat and not detrimental and stand replacing which could potentially downgrade or remove the habitat.

Treatment Prescription 4 – Ecological Fuel Reduction Treatment - Shaded Fuel Break
The shaded fuel break (145 acres that does not overlap with other treatments) will not have a direct effect on northern spotted owl foraging habitat.

Treatment Prescription 5 – Ecological Fuel Reduction Treatment - Chaparral Management
Treatment prescription 5 will not have a direct effect on northern spotted owl foraging habitat because chaparral does not function as foraging habitat.

Treatment Prescription 6 – Ecological Fuel Reduction Treatment - Back Fire Area
Treatments within the Back Fire will not have any direct effects on northern spotted owl foraging habitat.

Treatment Prescription 7 – Riparian Reserve Management
Treatment units within riparian reserves will follow prescriptions in treatments 1-6 but will adhere to a specific set of design features. The effects to foraging habitat will be the same as discussed under the other treatment prescriptions.

Indirect Effects on Foraging Habitat
Treatment Prescription 1 – Ecological Fuel Reduction Treatment - Plantation Areas
By treating plantations stand density is reduced and successional stage development will be promoted. Although the initial treatment will not change the current successional stage, it will expedite the process than if the stands were left to self-thin. Treatments will decrease competing brush species and remove trees to reduce competition for resources proving trees with the nutrients and space to grow into future foraging habitat.

Treatments will reduce ladder fuels and increase crown height reducing the risk of a moderate to high severity fire by removing small diameter trees and brush. This prepares the plantations to handle a wildfire with minimal impacts to the stands. See Table 36 for the CFA and flame length comparisons.

Treatment Prescription 2 – Ecological Fuel Reduction Treatment - Naturally Forested Areas
Treatment prescription 2 reduces density of trees less than 10” DBH in naturally forested areas and may also remove trees 10-20” DBH around individual conifers and hardwoods. This treatment indirectly effects northern spotted owl foraging habitat by releasing stressed trees and reducing ladder and surface fuels.

Treatment Prescription 3 – Ecological Fuel Reduction Treatment - Commercial Thinning
Treatment prescription 3 indirectly effects foraging habitat by preparing the landscape for and protecting it from uncharacteristic wildfire. By removing larger trees commercially it would reduce the amount of canopy fuels therefore reducing the chance of a fire being carried through the crowns and causing mortality of the larger trees. Treatment will also raise the average canopy base height reducing the chances of a fire even entering the crowns of the trees in the first place. As seen in Table 38, a majority of flame lengths are less than 4 feet which leads to the increase in surface fire and the decrease in crown fires.

Treatment Prescription 4 – Ecological Fuel Reduction Treatment - Shaded Fuel Break
The shaded fuel break, where it does not overlap with other treatments, would indirectly effect northern spotted owl foraging habitat by providing a break in fuel continuity. This would change fire behavior and provide a control point during wildfires and contribute to future prescribed burning activities. This treatment protects habitat within the late successional reserve and surrounding areas by reducing wildfire risk (see Table 37for CFA and flame length comparisons).

Treatment Prescription 5 – Ecological Fuel Reduction Treatment - Chaparral Management
Treatment prescription 5 would indirectly effect foraging habitat by treating chaparral fields to break up continuity of fuel. This will protect late successional habitat within the Pine Mountain LSR and the project area from uncharacteristic wildfire.

Treatment Prescription 6 – Ecological Fuel Reduction Treatment - Back Fire Area
Treatments within the Back Fire perimeter will indirectly effect northern spotted owl foraging habitat by reducing surface fuel loading and tree density, and maintaining the fire return interval. Since the fire in 2008 larger trees have begun to fall accumulating as surface fuel on the forest floor and creating the environment for a higher intensity wildfire. Treating the Back Fire area would decrease ladder and surface fuels to return fire to the landscape.

Treatment Prescription 7 – Riparian reserve Management
Treatment units within riparian reserves will follow prescriptions in treatments 1-6 but will adhere to a specific set of design features. The effects to foraging habitat will be the same as discussed under the other treatment prescriptions.

Alternative 3 – No New Temporary Roads

Direct and indirect effects to northern spotted owl under alternative 3 would be the same as alternative 2, the proposed action.

Alternative 4 – No Commercial Thinning in Riparian Reserves

Under alternative 4 there would be no commercial thinning in riparian reserves which would exclude 29 acres of nesting and roosting habitat and 638 acres of foraging from treatment. Even though these acres would receive treatment prescription 2 by default, they would continue to accumulate fuels and density would continue to increase. Although crown fire and torching would still be reduced under this alternative torching remains at 19% of the area and surface fire is 73% while under alternative 2 surface fire increases to 92% of the project area (Table 39).

Table 39. Table comparing Alternatives 1, 2, and 4 and crown fire activity within the project area post treatment

Crown Fire Activity	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 4 – No Commercial in RRs
Surface	18	92	73
Torching	33	4	8
Crown	49	5	19

Alternative 5 – No Commercial Thinning in Unites 3a, 19, 24b, and 33b (Northern Spotted Owl Nesting Habitat)

Alternative 5 would eliminate commercial thinning in 60 acres of nesting and roosting habitat for the northern spotted owl. These acres would then default into treatment prescription 2. Although crown fire activity post treatment would not differ drastically from the proposed action accumulation of fuels would continue to develop which could lead to a higher intensity fire. By not treating these 60 acres they maintain nesting and roosting status in the short term but in the long term density will increase which can decrease QMD and lower the BA. These two characteristics are important to maintain the late seral features of northern spotted owl nesting and roosting habitat.

Cumulative Effects

The cumulative effects analysis (CEA) considers past, present, and reasonably foreseeable future actions or activities. Past fire and silviculture treatments are summarized in the beginning of DEIS Chapter 3. This section considers the past, present, and future actions on TEP Species (Table 40). Spatial boundary for this CEA will spatially be 7^{th} field watersheds and temporally 20 years.

Table 40. Cumulative Effects summary for TEP species within Pine Mountain Project

Species	Past Effects	Present and Reasonably Foreseeable Effects	Cumulative Effects

Species	Past Effects	Present and Reasonably Foreseeable Effects	Cumulative Effects
Northern spotted owl	• Increase of snags for nesting • Loss of coarse woody debris • Fuels reduction protects late successional habitat from torching or crown fire	• Fuels reduction protects habitat from torching and crowning • Short term loss of coarse woody debris • Treating plantations to expedite growth into late seral stands	• Enhancement and protection of late successional habitat

Noise and Smoke

Noise and smoke-generating activities that occur within or adjacent to suitable northern spotted owl habitat has the potential to disturb nesting owls. To avoid disturbance, design features and limited operating procedures would be implemented as described in the project design features.

The limited operating period from February 1 through July 9 is intended to avoid the period from courtship to when the majority of young owls are freshly out of the nest, least mobile, and most likely to be on the ground.

Determination

Northern Spotted Owl - May Affect but Not Likely to Adversely Affect

Project design features to protect the northern spotted owl and its habitat, include:

- Retain all snags >20” DBH (unless deemed a hazard to firefighter safety)
- Existing large coarse woody debris (>20” diameter, or largest available) will be retained at 5-10 tons per acre
- A LOP for northern spotted owls will be applied from February 1 – July 9 within ¼ mile of suitable nesting habitat to minimize the potential for direct or indirect take caused by smoke or noise.
    - Once protocol surveys are completed for NSO (September 2017), this LOP will only apply to occupied nesting habitat and Activity Centers.

It is the determination of the wildlife biologist that the implementation of the Pine Mountain project “may affect but is not likely to adversely affect” the northern spotted owl due to modification of foraging and nesting and roosting habitat in the project area under Alternative 2 through 5. In the long term, this project is expected to have beneficial effects through restoration and protection of higher quality habitats. The project is consistent with the 2011 Northern Spotted Owl Recovery Plan and the 2012 Critical Habitat Rule. Limited operating periods would be imposed to prevent noise and smoke disturbance during the peak breeding season.

Northern Spotted Owl Critical Habitat- May Affect but Not Likely to Adversely Affect

Primary constituent elements (PCEs) within northern spotted owl critical habitat may be modified; however all important components of nesting/roosting/foraging/dispersal (NRFD) PCEs would be maintained in all treatment areas (Table 41). Fuel treatments in strategic areas would reduce the risk of fire ignitions along high use roads and provide greater protection to the Critical Habitat Unit (CHU). Thinning would accelerate the development of late-successional characteristics that favor northern spotted owls.

For alternatives 2 through 5, it is the determination of the wildlife biologist that the implementation of the Pine Mountain project "may affect but is not likely to adversely affect" northern spotted owl Critical Habitat due to modification of primary constituent elements, although current functionality of the NFRD PCEs would be maintained. In the long term, this project is expected to have a beneficial effect on Critical Habitat through restoration and protection of higher quality habitats. The project is consistent with the 2012 northern spotted owl Critical Habitat Rule.

Table 41 - Summary of effect from the proposed action on designated Northern spotted owl Critical Habitat

Primary Constituent Element	**Treatment Prescription 1**	**Treatment Prescription 2**	**Treatment Prescription 3**	**Treatment Prescription 4**	**Treatment Prescription 5**	**Treatment Prescription 6**	**Prescribed Fire (in conjunction with other treatments)**
1 – Forest Type	Will not modify	Will not modify	Will not modify	Will not modify	Will not modify	Will not modify	Will not modify
2 – Nesting/Roosting Habitat	Will not remove	Will not remove	Modifies but maintains	Modifies but maintains	Will not modify	Modifies but maintains	Modifies but maintains
3 – Foraging Habitat	Will not remove	Will not remove	Modifies but maintains	Modifies but maintains	Will not modify	Modifies but maintains	Modifies but maintains
4 – Dispersal Habitat	Modifies but maintains	Modifies but maintains	Modifies but maintains	Modifies but maintains	Will not modify	Modifies but maintains	Modifies but maintains

Sensitive Species

Sensitive species are those plants and animals identified by the Regional Forester for which continuation of species' viability is a concern. Impacts to these species are a decision of the Forest Service, in accordance with a biological evaluation which analyzes the significance of the impact on the species as a whole.

Sensitive Plant and Fungi Species

Methodology

The first step in the analysis was to determine whether any of the species of interest were known to be present in the vicinity of project area. This was done by checking the NRM TESP-IS database, as well as office files and maps. Next, the potential for species of interest to occur in the vicinity of the project area was evaluated based on GIS information, such as vegetation types, soils, and geology, and proximity to water. Field surveys were then conducted in areas that were potentially suitable habitat.

Survey Results

There are 23 plant species and 1 fungi on the Mendocino National Forest's Sensitive Plant List (USDA, 2013a).

There are no known Sensitive plant occurrences in the proposed project area. The proposed project area contains primarily mixed conifer, pine-oak woodland, and mixed chaparral vegetation. There are also small grasslands and a few areas of riparian vegetation associated with streams, seeps, and springs. The area was first visited in May 2008 to evaluated habitat. The moister drainages appeared to have possibly suitable habitat for *Cypripedium fasciculatum* and *Cypripedium montanum*. Please see Botany Report (USDA 2016) for a description of the suitable habitat for each species and whether that habitat is likely to occur in the proposed project area. Suitability is evaluated based on vegetation, soils, landform, aspect, and elevation.

Focused surveys for *Cypripedium fasciculatum* and *Cypripedium montanum* were conducted during July 2008 and July 2014, but no occurrences were found. The nearest known occurrences of these species are approximately 13 miles north and northeast of the proposed project area. Other surveys for *Cypripedium fasciculatum* and *Cypripedium montanum* on apparently suitable habitat in the southern portion of the Forest have also been negative.

Seeps and other perennially damp areas may be suitable habitat for *Botrychium crenulatum* and *Ophioglossum pusillum*. Surveys for these species were not conducted since their habitat is protected from project impacts.

The majority of the soils present in the proposed area are not known to support Sensitive plant species. There are small areas of Maymen-Etsel-Speaker and Maymen-Etsel-Snook soils, which do support the Sensitive species *Epilobium nivium* and *Sidalcea pillburiensis* elsewhere on the Forest. Despite the presence of these soils, the proposed project area does not have suitable habitat for *Epilobium nivium*, which grows in crevices of rocky outcrops and dry talus and shaley slopes on mountain tops, typically with a southern exposure. *Sidalcea pillburiensis* occurs in fairly open chapparal and knobcone pine vegetation, possibly as a fire follower. This plant community is not present in the project area.

Environmental Consequences

There are no known occurrences of T&E or Forest Service sensitive plants within the Pine Mountain project area. There will be no effect (direct, indirect, or cumulative) to T&E or Forest Service sensitive species. There will be protection measures where suitable habitat exists for sensitive plants to reduce negative effects to the species.

Sensitive Fish Species

The following fish species are listed as sensitive species for the Mendocino National Forest:

Chapter 8 **Western brook lamprey** (*Lampetrarichardsoni*)

Chapter 9 **Pacific lamprey** (*Entosphenus tridentatus)*

Chapter 10 **Hardhead*** *(mylopharodon conocephalus)*

Chapter 11 **Clear Lake Hitch*** *(Lavinia exilicauda chi)*

*These species will not be futher analyzed because:
1) The project is not within the distribution range of Clear Lake Hitch (Moyle, 2002).
2) Habitat and/or species are not present in project area for Hardead (Moyle, 2002).

Two Forest Service Sensitive fish species have been found within project watersheds; Pacific lamprey and Western brook lamprey. Both are dependent on cool to cold water streams; lamprey larvae are documented as preferring water temperatures less than 20ºC (68ºF) and having metabolic problems at higher temperatures. Water temperatures of 22ºC were found to cause death or deformation of effs and ammocoetes in laboratory studies on Pacific lamprey (Meeuwig et. al 2005).

Pacific lamprey is an anadromous fish and can ascend waterfall barriers that block other fish. It is possible that they can be found further upstream than steelhead. However, the Cape Horn dam and its Van Arsdale fish ladder (which are about 6 miles downstream of closest portion of the project, and outside of Forest Boundary) have had limited Pacific lamprey passage for more than a century. It is possible that Pacific lamprey and western brook lamprey are present in some locations in Bucknell and Benmore creeks in some years, but no juveniles have been located to date.

Suitable habitat for all life stages of lamprey have been found in portions of the Eel River. Juvenile lamprey (ammocoetes) depend on sufficient accumulation of silt and fine sands for refuge. High stream gradients and flushing flows do not allow the aggradation of fines that ammocoetes require. Marginally suitable juvenile lamprey habitat can be found in some years in the same streams that support steelhead in the Soda Creek watershed, but surveys show that suitable habitat in tributaries is very limited.

FSS western brook lamprey have been found in the Eel River below proposed project work and have been documented in Bear Creek of the Rice Fork watershed. 2015 surveys located western brook lamprey in Rice Fork near the mouth of Bear Creek. 2015 spring surveys generally failed to find suitable habitat for these fish due to lack of sufficient fines, except in the Eel River below Lake Pillsbury.

The headwaters of Packsaddle Creek lie within the project boundaries and this stream is a tributary to Rice Fork. No fish have been documented in Packsaddle Creek adjacent to the project, but nonnative Sacramento pike-minnow have been found in lower Packsaddle Creek and Rice Fork upstream and downstream of the project area. There is no suitable juvenile rearing habitat for western brook lamprey in Packsaddle Creek or the adjacent Rice Fork due to the high stream gradient and insufficient instream fines.

Summary of Determinations Forest Service Sensitive Fish Species

The project area is within the elevation and geographic range of the **Pacific lamprey and Western Brook Lamprey**, but a very small amount of acres are being affected and the species is not present during implementation; therefore, it is determined that the Pine Mountain Late-Successional Reserve Habitat Protection and Enhancement Project will not affect the Pacific lamprey or the Western Brook Lamprey.

The project area is within the elevation range but not in the geographic range of the **Clear Lake Hitch** or the **Hardhead**; therefore, it is determined that the Pine Mountain Late-Successional Reserve Habitat Protection and Enhancement Project will not affect the Clear Lake Hitch or the Hardhead.

Determinations of effects to species from all Pine Mountain Forest Service Sensitive project action alternatives are summarized in Table 42.

Table 42. Summary of species determination (all action alternatives)

Species	Species Present	Project within Distribution Range	Habitat in or near project area	Determination (all action alternatives)
Pacific Lamprey *(Entosphenus tridentatus)*	N	Y	Y	May Affect not Likely to Adversely Affect
Western Brook Lamprey (*Lampetra richardsoni)*	N	Y	Y	May Affect not Likely to Adversely Affect
Clear Lake Hitch (*Lavinia exilicauda chi)*	N	N	N	No Effect
Hardhead *(Mylopharodon conocephalus*)	N	Y	N	No Effect

Sensitive Wildlife Species

There are 11 Forest Service Sensitive Species (FSS) that have a habitat component that will be affected by the Pine Mountain LSR Habitat Enhancement and Protection Project. The following FSS has been analyzed in the Biological Evaluation:

Northern goshawk (*Accipter gentilis*)
Bald Eagle (*Haliaeetus leucocephalus*)
Pallid bat (*Antrozous pallidus*)
Townsend's big-eared bat (*Corynorhinus townsendii*)
Pacific marten (*Martes caurine*)
Pacific Fisher (*Pekania pennant*)
Fringed myotis (*Myotis thysanodes*)
Foothill yellow-legged frog (*Rana boylii*)
Western pond turtle (*Emys marmorata*)

North American wolverine will not be evaluated in this document because there is no suitable habitat within the project area and the closest reported sightings are near Hull Mountain which is 10 miles from the project area, as the crow flies. Wolverines uses subalpine and alpine habitats generally far from humans and human development (CWHR 2017, Keith et.al. 2007).

Karin's checkerspot butterfly will not be analyzed in this BE because the known population is located on Hull Mountain, about 10 miles, as the crow flies, from the project area (Baughman and Murphy 1998).

The project is outside the range for the Willow flycatchers (*Empidonaz traillii*), thus will not be discussed further in this section.

Northern Goshawk – Affected Environment

<u>Species Account</u>

At the time the LSRA (USDA 2000) was written there were three incidental sightings of northern goshawks near Benmore Creek in 1981, 1989, and 1994. These sightings overlap with NSO territories 4015 and 4047. Parts of the Pine Mountain LSR were surveyed for northern goshawks in 1997 but no goshawks were detected.

There was one nest within the Pine Mountain project boundary near White Pebble Spring and Benmore Creek. The next nearest nests are about 2.5 miles to the northwest near the confluence of Cedar and Panther Creeks. There are nine unconfirmed sightings of northern goshawks within the Pine Mountain project boundary documented in NRIS Wildlife. Six of these sightings are near White Pebble and Violet Springs, one sighting on the 18N25 road near the junction with 18N37, one sighting near Montgomery Glade, and another sighting along Packsaddle Creek southeast of 18N25 road (Fig. XX).

<u>Habitat</u>

Northern goshawks nest in a variety of forest types, ages, structural conditions, and successional stages (Reynolds et al. 1992). There is suitable nesting habitat for goshawks but there are no known nests currently in the planning area. Optimum habitat for the goshawks consists of conifer/hardwood, mixed conifer, red fir, or white fir composed of trees 24" DBH or greater and a canopy closure 40% or greater. Sub-optimum habitat for the goshawk may consist of trees 12-24" DBH with canopy cover as low as 20%. Nests are generally at the bottom of the northern slope where adults can perch above the nest to see into the nest. Nest are also close to water and openings suitable for foraging (>0.1 acre in size).

Prey for the northern goshawk are ground and tree squirrels, rabbits and hares, large passerines, woodpeckers, game birds, and corvids, occasionally reptiles and insects (Squires and Reynolds 1997). Their diet may vary seasonally due to differences in timing of migration, hibernation, or periods of inactivity among prey species, the cyclic nature of some prey species, or difference in food preferences among goshawks (Reynolds et al. 1992).

Within the Pine Mountain Late Successional Reserve (LSR) (~11,722 acres) there are 3,502 acres of optimum habitat and 2,577 acres of suboptimum habitat for the Northern goshawk with the potential for 2,963 acres of optimum and suboptimum habitat in the future. The LSR could support 10 nesting home ranges (600 core acres) (USDA Forest Service, 2000).

Design Features

- Restrict habitat modifying activities between March 1st and August 31st within primary nest zones
- Restrict loud and/or continuous noise within ¼ mile of active nest sites during March 1st – August 31st

Environmental Consequences- Northern Goshawk

Alternative 1 – No Action

The Northern goshawk and its habitat would not be directly affected by the No Action alternative however indirect effects include the loss of nesting and foraging habitat. Although stands of mature coniferous forests may continue to advance in the short term as well as the creation of snags and dead and down material, they will eventually be lost to natural disturbances. Without treatment in the planning area, areas of early seral habitat are not created or maintained to become mature conifer stands to provide nesting habitat in the future. Goshawks forage in more open stands and under this alternative the forest will continue to become denser and close in open foraging areas. Open areas also provide habitat for goshawk prey species in the understory. Diversity of the understory will be lost as the canopy continues to close. Without the treatment there is also the increasing risk of losing habitat to stand replacing wildfires or other natural disturbances.

Alternative 2 – Proposed Action

Direct Effects

The proposed action will have no direct effects on northern goshawk as there are no known nesting goshawks within the project area.

Indirect Effects

The proposed action may have indirect effects on the northern goshawk. There are 1272 acres of montane hardwood/conifer and 5247 acres of Sierran mixed conifer habitats within the project area. Within treatment units that will receive >10" thinning (Treatment Prescription 3) there is currently 48 acres of montane hardwood/conifer and 1432 acres of Sierran mixed conifer and after treating these units it is projected that there will be 65 acres of montane hardwood conifer and no change in the acreage of Sierran mixed conifer. Canopy cover will be maintained at a percentage based on the habitat designation for northern spotted owls and will not be reduced below 40%. Although the density of trees will be reduced the trees that will be retained will be the largest available that exhibit late seral elements.

Prescribed fire, by itself or that may follow mechanical or hand treatment, will reduce the amount of small diameter surface fuel and is expected to kill some understory vegetation within timbered stands and suppress brush growth. Burning may kill larger trees within timbered stands but is expected to be less than 10% mortality in trees greater than 16" diameter at breast height. Mortality in the understory, and potential mortality in the overstory, will help contribute to the mosaic of openings required by northern goshawk for foraging.

Alternative 3
Alternative 3 (Alternative 2 but no new temp roads) would have the same direct and indirect effects on northern goshawk as the proposed action, Alternative 2.

Alternative 4
Alternative 4 (Alternative 2 but no commercial thinning in Riparian Reserves) would have the same direct and indirect effects on northern goshawk as the proposed action, Alternative 2.

Alternative 5
Alternative 5 (Alternative 2 but no commercial thinning in northern spotted owl nesting/roosting habitat) would have the same direct and indirect effects on northern goshawk as the proposed action, Alternative 2.

Determination – Northern Goshawk
It is the determination that the proposed action may affect individuals but is not likely to result in a trend toward Federal listing for the northern goshawk. Suitable habitat will be maintained post-treatment and if any breeding pairs are discovered during the life of the project a Limited Operating Period will be established.

Bald Eagle – Affected Environment
Species Account
There is one unconfirmed observation of a bald eagle near Montgomery Glade within the project area. Pacific Gas & Electric conducts surveys around Lake Pillsbury. There are nests near Lake Pillsbury but outside of the Pine Mountain project boundary. The Rice Fork nest (Nest A) was first found active in 2001 and last showed evidence of nest rebuilding/construction in 2012. A new nest (Nest B) was found in 2013 north of Nest A and had a large adult in the nest. Both nests are within ½ mile of the Pine Mountain planning area. There are also several observations of eagles along the Eel River, but outside of the project boundary.

Lake Pillsbury and the Eel River to the north of the planning area are suitable habitat for the bald eagle.

Habitat
Optimum breeding season habitat for eagles is conifer/hardwood, Douglas fir, mixed conifer, or ponderosa pine with greater than 20% crown closure. Nests are generally found in mature or old-growth trees such as dominant sugar and ponderosa pines with large limbs and open crowns, snags, cliffs, rock promontories, and rarely on the ground or on human-made structure such as power poles and communication towers (USFWS 2007).

Bald eagles require large bodies of water and/or free-flowing rivers with adjacent snags or other structures for perching. They are opportunistic feeders and fish comprise most of their diet but they also prey on waterfowl, shorebirds/colonial water birds, small mammals, turtles, and carrion. Ideal nest sites are no more than a mile from a foraging area. Eagles may be seen foraging in the planning area of Pine Mountain due to its proximity to Lake Pillsbury and the Eel River but nesting is unlikely.

Design Features

- Retain all snags >20” DBH (unless deemed a hazard to firefighter safety)
- Restrict activities that may disrupt reproduction between January 1 – July 31 within a primary nest zone (1/2 mile around known bald eagle nests)

Environmental Consequences – Bald Eagle

Alternative 1 – No Action

Bald eagles are not likely to be nesting in the Pine Mountain planning area but their foraging habitat could be indirectly affected under the No Action alternative. Without treatments the likelihood of a stand replacing wildfire increases and may affect areas outside of the planning area and potential nesting areas for the eagle.

Alternative 2 – Proposed Action

Direct Effects

The project will have no direct effect on bald eagles because there are no eagles nesting within the project boundary.

Indirect Effects

The proposed action may have indirect effects on bald eagles. There are 48 acres of montane hardwood/conifer, 29 acres of Douglas-fir, 1432 acres of Sierran mixed conifer, and 114 acres of ponderosa pine habitats that will receive Treatment Prescription 3 (Thinning >10” DBH). Post treatment the only acreage change is the montane hardwood conifer that increases to 65 acres. Canopy closure will be retained in each unit based on the northern spotted owl habitat designation and will not be reduced below 40%. Although it is unlikely that bald eagles will be nesting within treatments units, potential nesting trees are retained because the treatment aims to retain the largest and most vigorous trees that exhibit late seral characteristics.

Snags are important to bald eagles as roost or nest trees and may be removed during mechanical treatments. During treatment all snags >20” DBH (unless deemed a hazard to firefighter safety) will be retained.

Prescribed fire, by itself or following hand or mechanical treatments, may consume smaller diameter snags but larger snags are generally not consumed. Smaller snags may also be created by prescribed fire but will likely be smaller than those generally used by bald eagles.

Alternative 3

Alternative 3 (Alternative 2 but no new temp roads) would have the same direct and indirect effects on bald eagle as the proposed action, Alternative 2.

Alternative 4

Alternative 4 (Alternative 2 but no commercial thinning in Riparian Reserves) would have the same direct and indirect effects on bald eagle as the proposed action, Alternative 2.

Alternative 5

Alternative 5 (Alternative 2 but no commercial thinning in northern spotted owl nesting/roosting habitat) would have the same direct and indirect effects on bald eagle as the proposed action, Alternative 2.

Determination – Bald Eagle

It is the determination that the proposed action may affect individuals but is not likely to result in a trend toward Federal listing for the bald eagle. Suitable foraging habitat will be maintained post-treatment and if any breeding pairs are discovered during the life of the project a Limited Operating Period will be established.

Pacific Fisher – Affected Environment

Species Account

There no surveys for fishers conducted within the Pine Mountain LSR. A fisher was sighted by Bob Faust in 2002 near White Pebble Spring and in 2015 archeologist technicians sighted a fisher near the end of the 17N40 road. In October 2015, a fisher was sighted along M1 south of the project area by Laura Bates, OHV Technician, and myself.

In 2004, the USFWS published a proposed rule that listed population on the western coast and Sierra Nevada Mountains as a Distinct Population Segment (USFWS 2004). The fisher was petitioned for listing as threatened or endangered last in 2010, and in 2012 the USFWS concluded that listing may be warranted, but is precluded. In 2016, there was a withdrawal of the proposed rule to list the west coast distinct population segment of fisher.

Habitat

Fishers were historically distributed throughout the mature and old growth forest on the Mendocino National Forest (USFS 1995). They inhabit large areas of mature mixed conifer forests, specifically closer to streams, farther from openings, with large trees, dense canopy closure, and a high density of snags (Beyer and Golightly 1996). Optimum denning/resting habitat consists of old-growth and/or mature conifer, mixed conifer/hardwoods, and/or hardwoods. Foraging habitat consists of mid-successional habitat of the same species as denning/resting habitat. A heterogeneous forest structure is important for fishers in denning, resting, and foraging habitats. The Mendocino LRMP (1995) suggests 3-4 layers for high quality habitat and 2-3 layers for moderate habitat, plus shrubs.

Large trees with cavities are extremely important for fisher reproduction. These attributes provide weather protection for kits during the typically cool and wet spring and protection from predators (Lofroth et al. 2010). The female may use alternate den sites until the kits are weaned and after kits are weaned and able to roam with their mother, alternate den sites or other tree cavities are used because they offer protection from predators (ibid). Most cavities are a result of heartwood decay (ibid; USFWS 2012), and access to the cavity is through a broken branch, cracks in the trunk, fire scars, or woodpecker hole. Canopy cover in den locations is high, 70–100 percent (Lofroth et al. 2010).

Dens can also be used as rest sites, and will also include such structures as hollow logs, fallen trees, witches' brooms or mistletoe-infected growths, deformed branches, and occasionally rocks, stick nests, and slash piles (USFWS 2004). Rest site trees, like den sites, are usually some of the largest diameter trees available, including conifers and hardwoods (ibid). Hardwood species are often used according to California studies and black oaks in particular (ibid). In northern California, fisher rest sites have a canopy cover of at least 40 percent (ibid).

Fishers tend to avoid open areas and travel corridors are important features for them on the landscape. In high quality habitat road desnity is 0-0.5 miles per square mile and in moderate quality habitat it is 0.5-2 miles per square mile. In optimum habitat openings without cover are generally less than an acre in size and in moderate habitat they are 1-2 acres. Travel corridors should be 600 feet with a canopy cover greater than 60% for optimum habitat and 300-600 feet wide with 50-60% canopy cover for moderate habitat, in mature stands. Travel corridors adjacent to clearcuts should be doubled in width for optimum and moderate habitat (USDA Forest Service 1995).

At the time the LSRA was written there was 3,502 acres of optimum habitat and 2,577 acres of suboptimum habitat within the LSR. The LSR does not currently contain the required amount of habitat to maintain one male home range but may be utilized as connectivity between LSRs. There is a potential for 2,963 additional acres to grow into mid to late successional habitat that could, provided it was optimum habitat, support one male home range or one or two female home ranges (USDA Forest Service 2000).

Design Features

- A Limited Operating Period will be put in place from February 1 to June 30 if within ¼ mile of a known denning site
- All snags >10" DBH will be retained unless they pose a hazard to firefighter safety or have the potential to spread fire across control lines.
- Existing large coarse woody debris (>20" diameter, or largest available) will be retained at 5-10 tons per acre.

Environmental Consequences- Pacific Fisher

Alternative 1 – No Action

Under the No Action alternative there is no direct effect on the Pacific fisher. Indirect effects to fishers include old-growth and mature stands developing an understory of shade tolerant species that may out compete the conifer and hardwood component generally selected by the fisher. Travel corridors and small openings would be maintained for a time until the surrounding forest began to encroach upon these features. Without treatment the stands remain overstocked and become more susceptible to a stand replacing wildfire and other natural disturbances.

Alternative 2 – Proposed Action

Direct Effects

Fishers use large diameter trees, snags, and downed logs for resting and denning. In the case of a lack of denning or resting structures, it is expected that the proposed action will create these structures, or protect and enhance the structures that are available.

Within the units that will receive Treatment Prescription 3 (>10" DBH thinning) the desired future conditions are enhanced and protected late successional habitat. The current acreage of mature seral habitat within these units is 666 acres and post-treatment this increases to 1656 acres and currently 666 acres of late successional habitat and post-treatment this increases to 1663. This indicates that the available resting and denning habitat is more than doubled post-treatment. This is accomplished by focusing tree retention on species and trees that provide structures more suitable to mature seral species.

Downed logs that may be used by fishers as denning or resting structures are expected to be consumed by prescribed fire, either following hand or mechanical treatments or when applied by itself. There are design features in place to retain existing large coarse woody debris up to 5-10 tons per acre. Although it is likely some large logs would be consumed or broken up during treatments those same treatments are expected to create large woody debris through mortality.

Indirect Effects
The Mendocino LRMP dictates high quality habitat as having road densities less than 1/2 mile of road per square mile. Currently there are about 30 miles of Forest Service roads within the project area. Nineteen miles of these roads within the project will receive treatment (maintenance, reconstruction, decommissioning, and/or closure). The proposed action would require, 4.48 miles of reconstruction of existing undesignated roads and 0.25 miles of new temporary road construction. The construction of new roads could create barriers for fishers. On the other hand there will be 1.14 miles of road decommissioned.

Canopy cover within Treatment Prescriptions 3 units will be maintained based on the NSO habitat designation. In some units the canopy cover may be reduced to 40%. Where dens are likely to be located, concurrent with NSO nesting/roosting habitat, canopy cover will not be reduced below 60%. Although this is below the identified canopy cover percentage by Lofroth et al. (2010) preferred in denning sites, there are no known den sits within the Pine Mountain project area.

<u>Alternative 3 – Proposed Action + No New Temporary Roads</u>
Alternative 3 will have the same direct effects on fisher as Alternative 2. Indirect effects may be less under this alternative since no new temporary roads will be created thus reducing the acreage of open areas that may act as a barrier to marten movement.

<u>Alternative 4 – Proposed Action + No Commercial Thinning in Riparian Reserves</u>
Alternative 4 will have the same direct and indirect effects on the fisher as Alternative 2.

<u>Alternative 5 – Proposed Action + No Commercial Thinning in designated Northern Spotted Owl Nesting Habitat</u>
Alternative 5 will have the same direct and indirect effects on fisher as Alternative 2.

<u>Determination – Pacific Fisher</u>
It is the determination that the proposed action may affect individuals but is not likely to result in a trend toward Federal listing for the Pacific fisher. Design features ensure the retention of

denning structures and a Limited Operating Period will be enforced should a fisher den be found.

Pacific Marten – Affected Environment

Species Account

When the LSRA was written in 2000 there had been no sightings of martens and no surveys conducted.

There are no reported sightings of martens within the Pine Mountain project area in the NRIS Wildlife database. There is an observation on the north east end of Lake Pillsbury at Sunset campground about three miles, as the crow flies, from the project boundary. The location of this sighting is about 1000 feet in elevation lower than the majority of the project area, but is similar to the eastern and western sides although vegetation type differs. There are two other observations further from the project (about 6 miles in either direction) area at Bear Creek campground and near the 19N74 road.

Habitat

Pacific martens inhabit coniferous forests, specifically late successional stands with a sufficient amount of dead and down material (USFS 2004). Denning and roosting sites tend to be in forests with trees greater than 12” DBH and a canopy cover of greater than 40%. Preferred stands are generally thick with basal area 175 ft^{2} or greater. Historically martens have inhabited the higher elevations (>5,500 ft) of the Mendocino National Forest in true fir stands but most recent records indicate that they may be moving into the conifer stands at lower elevations (USFS 1995). Martens are typically associated with these higher elevations and true fir forests that support frequent winter snowfall (MIS report, USDA 2017a). The Pine Mountain LSR, 1800 – 4000 ft elevations with late successional conifer and hardwood-conifer habitat may be suitable for martens but they are less likely to use these lower elevations if fishers are present (MIS report, USDA 2017a).

Travel corridors are important for martens as protection from predators. The Habitat Capability Model for the marten in the Mendocino National Forest Land and Resource Management Plan suggests that optimum travel corridors are at least 300 feet wide within mature stands and at least 600 feet wide adjacent to open, uncanopied areas, such as meadows. Corridor widths down to 150 feet for mature stands and 300 feet adjacent to open areas are acceptable but less desirable. Canopy closure for travel corridors should be at least 50% (USFS 1995). A study in Utah found that martens were rarely detected in sites with greater than 25% open areas (Hargis et al. 199?) and in Yellowstone National Park, martens did not readily cross open areas wider than 100 meters (Brissonetter and Sherburne 1993).

Open areas wider than 100 m could be considered roads which could be barriers to martens. The Habitat Capability Model in the Mendocino LRMP recommends 1-2 miles of road per square mile for moderate quality habitat and less than one miles of road per square mile for high quality habitat.

Snags, live trees with deformities, and down wood are important structures for martens for den and rest sites, protection from predators, and for hunting and foraging sites (Bull et al. 2005). The MNF LRMP suggests three snags per acre greater than 24” DBH for denning or resting and at least three snags per acre greater than 15” DBH for foraging. As for down logs, the MNF LRMP suggests 20 per acre at least 15” by 15’ long or for sub-optimum habitat, 10-19 down logs per acre at least 15” by 15’ long. Based on Habitat Capability Model for the marten found in the Mendocino LRMP (1995), snag replacement densities should be at least 6 snags per acre greater than 24” DBH for sub-optimum habitat (>9 snags/acre for high quality habitat) or greater for resting and denning and at least 15” DBH in foraging habitat.

Within the whole Pine Mountain LSR (~11,772 acres) there are 3,501 acres of optimum habitat and 2,363 acres of suboptimum habitat for the marten. There is a potential for an additional 1,963 acres of suitable habitat within the LSR. Currently the LSR could support 2.8 male home ranges and 5.6 female home ranges with the additional acreage another 1.4 male and 2.8 female home ranges could be supported (USDA Forest Service, 2000).

Design Features

- A Limited Operating Period will be enforced from February 1 to June 30 if activities that could disrupt reproduction are occurring within ¼ mile of a known denning site
- All snags >10” DBH will be retained unless they pose a hazard to firefighter safety or have the potential to spread fire across control lines.
- Existing large coarse woody debris (>20” diameter, or largest available) will be retained at 5-10 tons per acre

Environmental Consequences – Pacific Marten

Alternative 1 – No Action

Under the No Action alternative there is no direct effect on the Pacific marten. Indirect effects include the creation of true fir stands. As the white fir and other firs overtake the conifer-hardwood stands habitat is created for the marten. Martens also inhabit conifer stands at lower elevations which could be lost without treatment. Although increased dead and down would benefit the marten it also poses a greater risk of wildfire. Without treatment the stands become more susceptible to a stand replacing wildfire and other natural disturbances.

Alternative 2 – Proposed Action

Direct Effects

Martens use large diameter trees, snags, and downed logs for resting and denning. In the case of a lack of denning or resting structures, it is expected that the proposed action will create these structures, or protect and enhance the structures that are available.

Within the units that will receive Treatment Prescription 3 (>10” DBH thinning) the desired future conditions are enhanced and protected late successional habitat. The current acreage of late successional habitat within these units is 666 acres and post-treatment this increases to 1663 acres. This indicates that the available resting and denning habitat is more than doubled post-treatment. This is accomplished by focusing tree retention on species and trees that provide structures more suitable to late successional species.

Snags that may be used by martens as denning structures may be removed during treatments, either by hand or mechanical or prescribed fire. There are design features in place to retain all snags. Preferred snags are generally greater than 15” DBH for foraging and 24” DBH for denning. It is unlikely that prescribed would consume larger snags and it may even create snags through mortality in the overstory.

Downed logs that may be used by martens as denning or resting structures are expected to be consumed by prescribed fire, either following hand or mechanical treatments or when applied by itself. There are design features in place to retain existing large coarse woody debris up to 5-10 tons per acre. Although it is likely some large logs would be consumed or broken up during treatments those same treatments are expected to create large woody debris through mortality.

Indirect Effects
The Mendocino LRMP dictates high quality habitat as having road densities less than one mile of road per square mile. Currently there are about 19 miles of Forest Service roads within the project area that will receive treatment (maintenance, reconstruction, decommissioning, and/or closure). The proposed action would require use 3.9 miles of existing undesignated roads, 0.58 miles of reconstruction of existing undesignated roads and 0.25 miles of new road construction. Although it could be assumed that roads would be a barrier (as an open area) to martens, Robitaille and Aubry (2000) found that martens were as likely to be detected near roads as there were away from roads and Pereboom et al. (2008) found the marten did not avoid roads. There will also be 0.3 miles of road decommissioning and 17.6 miles of non-system trails closed which will benefit the marten in removing potential barriers.

Indirect effects could occur for the marten by reducing the canopy cover in stands receiving Treatment Prescription 3 (ecological fuel reduction treatment - commercial thinning). Although canopy cover in those units will not be reduced below 40%, Bulle and Blumton (1999) found that radio collared martens avoided harvested stands that had less than 50% canopy closure.

<u>Alternative 3 – Proposed Action + No New Temporary Roads</u>
Alternative 3 will have the same direct effects on martens as Alternative 2. Indirect effects may be less under this alternative since no new temporary roads will be created thus reducing the acreage of open areas that may act as a barrier to marten movement.

<u>Alternative 4 – Proposed Action + No Commercial Thinning in Riparian Reserves</u>
Alternative 4 will have the same direct and indirect effects on marten as Alternative 2.

<u>Alternative 5 – Proposed Action + No Commercial Thinning in designated Northern Spotted Owl Nesting Habitat</u>
Alternative 5 will have the same direct and indirect effects on marten as Alternative 2.

Determination – Pacific Marten
It is my determination that the proposed action may affect individuals but is not likely to result in a trend toward Federal listing for the Pacific marten. Design features ensure the retention of denning structures and a Limited Operating Period will be enforced should a marten den be found.

Townsend's Big-eared Bat- Affected Environment

Species Account

When the LSRA was written in 2000 there had been no surveys conducted for bats within or in the vicinity of the LSR.

One visual survey was conducted after the LSRA was written at a PG&E Cabin near Lake Pillsbury, but no Townsend's big-eared bats were located during the survey.

Habitat

Townsend's big-eared bats use a variety of habitats, mostly montane forests with pine, fir, and aspen trees surrounded by shrub and grasslands. These bats roost in caves, cliffs, rock ledges, abandoned mines, buildings, and in open attics. Roosting places are generally cooler with a lot of air movement and have open ceilings as Townsend's big-eared bats do not crawl well (Sullivan 2009). They tend to have high fidelity towards maternity roosts often returning year after year to certain roosts, particularly caves (Fellers and Pierson 2002).

Townsend's big-eared bats in the west typically forage in dense foliage. Fellers and Pierson (2002) found that in coastal California, bats mainly forage in riparian woodlands. The bats would vacate their roost at night and follow densely vegetated gullies and then spent a majority of their time foraging in forested habitats, utilizing the forest edge but avoiding open areas. Their prey tends to be exclusively moths but they will also eat beetles, flies, and other small insects (Sullivan 2009).

There is suitable foraging habitat within the Pine Mountain planning area for Townsend's big-eared bats, but lacks caves or other roosting structures.

Design Features

- Limited Operating Period from May 15 to August 15 if within 300 feet of any rock outcrop or other known roost structure of site for protection from noise disturbance

Environmental Consequences – Townsend's Big-eared Bat

Alternative 1 – No Action

Townsend's big-eared bats would not be directly affected by alternative 1 but indirect effects may include an increase in vegetation density which would increase foraging opportunities for the bats. On the other hand, this dense forest is prone to loss due to wildfires or bark beetle infestations.

Alternative 2 – Proposed Action

Direct Effects

The proposed action would not have direct effects on Townsend's big-eared bats as there are no significant roosting structures within the project area.

Indirect Effects

The proposed action may have indirect effects on Townsend's big-eared bats by reducing the amount of available foraging habitat. These bats forage in denser foliage but the proposed action proposes to reduce density within the project area through hand or mechanical thinning and/or prescribed burning. Shrubs and forbs and grasses will also be reduced through the same actions, but have a shorter regrowth time, 1-10 years and 1-2 years, respectively.

Alternative 3 – Proposed Action + No New Temporary Roads
Alternative 3 will have the same direct and indirect effects as Alternative 2 on Townsend's big-eared bats.

Alternative 4 – Proposed Action + No Commercial Thinning within Riparian Reserves
Alternative 4 will have the same direct and indirect effects as Alternative 2 on Townsend's big-eared bats.

Alternative 5 – Proposed Action + No Commercial Thinning within Designated Northern Spotted Owl Nesting Habitat
Alternative 5 will have the same direct and indirect effects as Alternative 2 on Townsend's big-eared bats.

Determination – Townsend's Big-eared Bat

It is my determination that the proposed action may affect individuals but is not likely to result in a trend toward Federal listing of Townsend's big-eared bat. There are no significant roosting structures within the project area and foraging habitat will only be diminished in the short term.

Fringed Myotis – Affected Environment

Species Account
There have been no surveys conducted for bats within the Pine Mountain project area. It is likely that fringed myotis use the project area for roosting.

Habitat
The fringed myotis uses caves, crevices, mines, and buildings for roosting, hibernacula, and maternity colonies (Keinath 2005; CWHR 2008). They day and night roost under bark and in tree hollows, and in northern California they day roost in snags only (Keinath 2005; Weller and Zabel 2001). Medium to large diameter snags are important day and night roosting sites (Weller and Zabel 2001).

In California, this species is found from 1300 to 2200 meters in elevation in pinyon-juniper, valley foothill hardwood and hardwood-conifers (CWHR 2008).

There is increased likelihood of occurrence of this species as snags greater than 30 cm in diameter increases and percent canopy cover decreases (Keinath 2005). Large snags and low canopy cover, typical of mature, forest habitat types, offer warm roost sites (Keinath 2005). Decay classes were two to four (Keinath 2005) in ponderosa pine, Douglas-fir, and sugar pine.

Home range size varies with insect abundance, increasing as the number of available insects decreases. Keinath (2005) reports study averages about 100 acres. Travel distances from roosting to foraging areas are up to eight kilometers (Keinath 2005).

The fringed myotis consumes primarily beetles, and is supplemented by moths and fly larvae (Keinath 2005) captured in the air and on foliage (CWHR 2008).

Design Features

- All snags >10" DBH will be retained unless they pose a hazard to firefighter safety or have the potential to spread fire across control lines

Environmental Consequences

Alternative 1 – No Action

Fringed myotis and their habitat would not be directly affected by alternative 1, No Action. Indirect effects could include loss of roosting structures, such as snags, to natural disturbances such wind or wildfires. Without treatment trees continue to be suppressed and compete for resources resulting in a lack of larger trees to replace larger snags that have fallen, therefore, reducing the number of available roosting structures.

Alternative 2 – Proposed Action

Direct Effects

The proposed action may have a direct effect on fringed myotis by removing snags that may be used for roosting. Snags may be removed by prescribed fire, either following a hand or mechanical treatment or by itself, but in general larger snags are not consumed. Although fire usually creates smaller snags, larger snags may be created through mortality in the overstory.

Indirect Effects

By reducing stand density within the Pine Mountain project area fringed myotis will have a more open understory in which to forage.

Alternative 3 – Proposed Action + No New Temporary Roads

Alternative 3 will have the same direct and indirect effects on fringed myotis as Alternative 2.

Alternative 4 – Proposed Action + No Commercial Thinning in Riparian Reserves

Alternative 4 will have the same direct and indirect effects on the fringed myotis as Alternative 2.

Alternative 5 – Proposed Action + No Commercial Thinning in designated Northern Spotted Owl Nesting Habitat

Alternative 5 will have the same direct and indirect effects on fringed myotis as Alternative 2.

Determination – Fringed Myotis

It is the determination that the proposed action may affect individuals but is not likely to result in a trend toward Federal listing for the fringed myotis. Design features ensure the retention of snags that may be used for roosting.

Pallid Bat- Affected Environment

Species Account

When the LSRA was written in 2000 there had been no surveys conducted for bats within or in the vicinity of the LSR.

One visual survey was conducted after the LSRA was written at a PG&E Cabin near Lake Pillsbury, but no pallid bats were located during the survey.

Habitat

Pallid bats are common in desert habitats but they may also be found in oak and pine forests or open farmland (Weber 2009) but in some areas in California they may be using mixed conifer and evergreen habitats. Bats in California use day or night roosts that may be live trees or snags, rock crevices or buildings with day and night roost sites alternating (Baker et al. 2008). Baker et al. (2008) found that in the Sierra Nevada pallid bats were using live trees and snags for roosting that were consistently tall in height, large in diameter, and located in mature stands. These stands were commonly in micro-sites that have a low percentage of overstory and mid-story coverage that increased the chance of the sun warming their roost site. Roosts also may be near water sources but it is not a deciding factor (Weber 2009).

Pallid bats are gleaners and forage close to the ground (Baker et al. 2008). They prey on large flying and ground-dwelling insects, including beetles, crickets, katydids and grasshoppers, cicadas, moths, spiders, scorpions, and centipedes. Occasionally they will take small lizards and mice (Weber 2009).

There is suitable roosting habitat for pallid bats in the form of cavities in live and dead trees.

Design Features

- Retain all snags >20” DBH (unless deemed a hazard to firefighter safety)
- Limited Operating Period from May 15 to August 15 if within 300 feet of any rock outcrop or other known roost structure of site for protection from noise disturbance.

Environmental Consequences – Pallid Bat

Alternative 1 – No Action

Pallid bats and their habitat would not be directly affected by alternative 1, No Action. Indirect effects could include loss of roosting habitat to natural disturbances such as beetle infestations or wildfires. Pallid bat prey require ground cover of grasses or forbs and under this alternative, as the forest continues to become overcrowded, the sunlight does not reach the ground to promote growth of ground cover, thus reducing habitat for prey.

Alternative 2 – Proposed Action

Direct Effects

Pallid bats may be directly affected by the removal of trees and snags that may be used as roosts. Within Treatment Prescriptions 3 (Thinning of >10” DBH trees) there is 1432 acres of Sierran mixed conifer, 125 acres of oak habitat types, and 114 acres of ponderosa pine and after treatment there will be an increase in the amount of oak habitat available (142 acres). Thinning will decrease tree density but is focused on retaining the largest and most vigorous trees but may still remove a roost tree being used by pallid bats.

Prescribed fire, applied by itself or following hand or mechanical treatments, may also remove roost trees used by pallid bats. Snags that are consumed by prescribed are generally small in diameter and the larger snags likely to be used by bats are less likely to be lost to fire. Prescribed fire can also create smaller snags that may be used as roost trees.

Indirect Effects
Indirect impacts to the pallid bats may occur with the removal of shrubs, grasses and forbs, and litter and duff. Since pallid bats forage low to the ground there may be a temporary reduction in prey available during fuels reduction. Post-thinning and post-burning shrubs may take 1-10 years to grow back. Forbs and grasses can see regrowth 1-2 years post-treatment (thinning and/or burning) and sees minimal mortality. Mortality is common where skidding or pile burning occurs and during prescribed burning mortality is mostly above ground biomass.

Alternative 3
Alternative 3 (Alternative 2 but no new temp roads) would have the same direct and indirect effects on pallid bats as Alternative 2.

Alternative 4
Alternative 4 (Alternative 2 but no commercial thinning in Riparian Reserves) would have the same direct and indirect effects on pallid bats as Alternative 2.

Alternative 5
Alternative 5 (Alternative 2 but no commercial thinning in northern spotted owl nesting habitat) would have the same direct in indirect effects on pallid bats as Alternative 2.

Determination – Pallid Bat
It is the determination that the proposed action may affect individuals but is not likely to result in a trend toward Federal listing for the pallid bat. Roosting structures will be maintained post-treatment through design features pertaining to snag retention.

Western Pond Turtle- Affected Environment
Species Account
There are no recorded sighting of western pond turtle within the project boundary but there is suitable habitat. Western pond turtles historically ranged from Puget Sound to the Sierra San Pedro Martirs in Baja California Norte (Holland 1994).

Habitat
The pond turtle is a habitat generalist occurring in in permanent and ephemeral habitats below 2500 ft. in elevation (USFS 1995). Turtles have been sighted in rivers, streams, lakes, ponds, permanent and ephemeral wetland habitats, and altered habitats including reservoirs, abandoned gravel pits, stock ponds, and sewage treatment plants. Holland (1994) found that observations made in the altered habitats tend to be turtles that have been displaced by the destruction of natural habitats.

The size of water sources that turtles utilize vary on a seasonal and local basis. Turtles may use ephemeral ponds only a few meters in extent while others use lakes that are several dozen square kilometers. Turtles also inhabit ponds that may vary in size by 50% or more in a year and where water is present only portions of the year.

When water level varies turtles may aestivate in the mud or in upland areas adjacent to the watercourse during late-summer/early-spring. Turtles need emergent basking sites such as rocks, logs, or emergent vegetation. In places where these basking structures are absent turtles use refugia in the form of undercut banks, submerged vegetation, rocks, logs, or mud. Turtles avoid areas that lack sufficient refugia and areas of open water that may lack nearby refugia and/or basking sites. Turtles overwinter in the mud at the bottom of ponds or in undercut areas under banks or logs or areas of emergent vegetation (USFS 1995).

Hatchlings additionally require shallow, eutrophic, warm areas which are typically at the margins of natural waterways (Buskirk 2002).

Terrestrial habitats are less well understood. In southern California animals spend only one to two months in terrestrial habitats while animals in the northern portions of the range can be terrestrial for up to eight months (Lovich and Meyer 2002). Animals have been documented to overwinter under litter or buried in soil in areas with dense understories consisting of vegetation such as blackberry, poison oak and stinging nettle which reduces the likelihood of predation (Davis 1998).

Design Features

- Retain existing large coarse woody debris (>20" diameter, or largest available) up to 5-10 tons per acre

Environmental Consequences- Western Pond Turtle

Alternative 1 – No Action

Under the No Action alternative forest density and fuel accumulations will increase contributing to the potential of an uncharacteristic, stand replacing wildfire. This could remove vegetation that turtles may use as basking sites.

Alternative 2 – Proposed Action

Direct Effects

The proposed action could directly affect western pond turtles through soil compaction during thinning activities. This could prevent turtles from aestivating or could harm turtles that are currently aestivating. This direct effect is minimized through stipulations when treating within riparian reserves.

Indirect Effects

Indirect effects may include the loss of basking structures in the form of logs or streamside vegetation. Under the riparian reserve management stipulations the loss of these features is minimized. There is also a design feature to retain large coarse woody debris.
Indirect effects may also be sedimentation from treatment activities, but this is also mitigated through the riparian reserve management stipulations in Treatment prescription 7.

Alternative 3 – Proposed Action + No New Temporary Roads

Alternative 3 will have the same direct and indirect effects on western pond turtle as Alternative 2.

Alternative 4 – Proposed Action + No Commercial Thinning in Riparian Reserves

Alternative 4 will have the same direct and indirect effects on western pond turtle as Alternative 2.

Alternative 5 – Proposed Action + No Commercial Thinning in designated Northern Spotted Owl Nesting Habitat

Alternative 5 will have the same direct and indirect effects on western pond turtle as Alternative 2.

Determination – Western Pond Turtle

It is the determination that the proposed action may affect individuals but is not likely to result in a trend toward Federal listing for the Western pond turtle. Design features ensure the retention of logs for basking structures and riparian reserve management stipulations reduce impact to the riparian area probably most commonly used by turtles.

Foothill Yellow-legged Frog- Affected Environment

Species Account

Foothill-yellow legged frogs have been observed in several creeks within the Pine Mountain project area, including Bemore, Packsaddle, and Bucknell Creeks.

Habitat Account

The foothill yellow-legged frog occupies shallow portions of perennial streams and rivers with cobble-size substrate within open, sunny banks, in forests, chaparral, and woodland habitats (Californiaherps.com 2000, Jennings and Hayes 1994). Forest habitats include valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow types (CDFG 2005). Gravel and cobble river bars along riffles and pools with at least 20% shading seems to be preferred by sub-adults and adults (Ashton et al. 1998). Breeding habitat is typically classified as a stream with riffles containing cobble-sized or larger rocks as substrate (Morey 2000).Frogs may also be found in moderately vegetated backwaters, isolated pools, and slow moving rivers with mud substrates (Ashton et al. 1998).

Historic distribution of the frog was known to occur in most Pacific drainages from the Santian River system in Oregon to the San Gabriel River system in California (Jennings and Hayes 1994).

Environmental Consequences- Foothill Yellow-legged Frog

Alternative 1 – No Action

Under the No Action alternative, fuels will continue to accumulate and contribute to the potential of an uncharacteristic, stand replacing fire. This could lead to a loss of riparian vegetation and the shade required by foothill yellow-legged frogs.

Alternative 2 – Proposed Action

Direct Effects

There will be no direct effects on the foothill yellow-legged frog under Alternative 2.

Indirect Effects

Under the proposed action there are several stipulations for treating within riparian zones. These stipulations will help retain the habitat needed for the frogs by reducing sedimentation from treatment activities and maintaining canopy cover for shading.

Alternative 3 – Proposed Action + No New Temporary Roads
Alternative 3 will have the same direct and indirect effects on foothill yellow-legged frog as Alternative 2.

Alternative 4 – Proposed Action + No Commercial Thinning in Riparian Reserves
Alternative 4 will have the same direct and indirect effects on foothill yellow-legged frog as Alternative 2.

Alternative 5 – Proposed Action + No Commercial Thinning in designated Northern Spotted Owl Nesting Habitat
Alternative 5 will have the same direct and indirect effects on foothill yellow-legged frog as Alternative 2.

Determination – Foothill Yellow-legged Frog

It is the determination that the proposed action will not result in a trend toward Federal listing for the foothill yellow-legged frog.

Cumulative Effects

The cumulative effects analysis (CEA) considers past, present, and reasonably foreseeable future actions or activities. Past fire and silviculture treatments are summarized in the beginning of DEIS Chapter 3. This section considers the past, present, and future actions on Forest Service Sensitive Species (Table 43). Spatial boundary for this CEA will spatially be 7th field watersheds and temporally 20 years.

Table 43. Cumulative Effects Analysis on Forest Service Sensitive Species

Species	Past Effects	Present and Reasonably Foreseeable Effects	Cumulative Effects
Northern Goshawk	• Fuels reduction protects habitat from torching and crown fire	• Fuels reduction projects protects habitat from torching and crown fire • Retention of oaks and larger tress used by NOGO for nesting • May lead to temporary displacement of NOGO	• A decrease in fire risk to habitat
Bald Eagle	• An increase of snag creation benefitting wintering or foraging bald eagles	• Short-term disturbances to wintering bald eagles that are foraging during project implementation	• Cumulatively, past activities combined with Pine Mountain's activities will not affect reproduction or the overall range of the bald eagle
Pallid bat	• Increase in number of snags for	• Short term loss of understory vegetation for foraging	• Temporary loss of foraging habitat during

Species	Past Effects	Present and Reasonably Foreseeable Effects	Cumulative Effects
	roosting • Loss of understory vegetation for foraging		implementation
Townsend's big-eared bat	• Reduction of dense foliage for foraging	• Reduces dense foliage for forage	• Cumulatively, past, present, and future activated will reduce foraging for the bats, but will not likely affect roosting sites
Pacific marten	• Loss of coarse woody debris during fuels reduction work	• Reduces large coarse woody debris • Protected habitat from torching or crowning • Treating plantations to expedite growth into late seral stands	• Cumulatively projects may remove large coarse woody debris used for denning, but design features ensure retention of some woody debris
Pacific fisher	• Protected late seral habitat from torching or crowning • Increase of snags • Loss of coarse woody debris	• Density reduction in plantations expedites growth into late seral stands • Reduction of fuels protects existing late successional habitat	• Cumulatively projects treat stands to ensure retention of late successional habitat
Fringed myotis	• Increase in snags for roosting	• Short term displacement in immediate area of activity	• Cumulatively projects will not affect reproduction of the fringed myotis
Foothill yellow-legged frog	• protected streamside vegetation • Possible sedimentation from logging activities	• Protects streamside vegetation	• Cumulatively projects will not affect reproduction of the foothill yellow-legged frog
Western pond turtle	• Protects streamside vegetation • Possible sedimentation from logging	• Protects streamside vegetation	• Cumulatively projects will not affect reproduction of the western pond turtle

Species	Past Effects	Present and Reasonably Foreseeable Effects	Cumulative Effects
	activities		

Summary of Determinations Forest Service Sensitive Wildlife Species

Determinations of effects to species from all Pine Mountain Forest Service Sensitive project action alternatives are summarized in Table 44.

Table 44. Summary of species determination (all action alternatives)

Species	Status	Determination(all action alternatives)
California wolverine *(Gulo gulo luteus)*	Sensitive	No effect
Bald eagle *(Haliaeetus leucocephalus)*	Sensitive	May impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability
Northern goshawk (*Accipiter gentilis*)	Sensitive	May impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability
Pacific fisher (*Martes pennanti pacifica*)	Sensitive	May impact individuals, but is not likely to accelerate the trend toward Federal listing or result in loss of viability
Pacific marten *(Martes Americana*)	Sensitive	May impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability
Townsend's big-eared bat (*Corynorthinus townsendii)*	Sensitive	May impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability
Fringed myotis *(Myotis thysanodes)*	Sensitive	May impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability
Western pond turtle (*Clemmys marmorata marmorata)*	Sensitive	May impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability
Foothill yellow-legged frog (*Rana boylii)*	Sensitive	No Effect
Karin's checkerspot butterfly *(Euphydryas editha karinae)*	Sensitive	No Effect
Pallid Bat *(Antrozous pallidus)*	Sensitive	May impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability

Neotropical Migratory Birds

Under the National Forest Management Act (NFMA), the Forest Service is directed to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." (P.L. 94-588, Sec 6 (g) (3) (B)). The January 2000 USDA Forest Service (FS) Landbird Conservation Strategic Plan, followed by Executive Order 13186 in 2001, in addition to the Partners in Flight (PIF) specific habitat Conservation Plans for birds and the January 2004 PIF North American Landbird Conservation

Plan all reference goals and objectives for integrating bird conservation into forest management and planning.

In late 2008, a *Memorandum of Understanding between the USDA Forest Service and the US Fish and Wildlife Service to Promote the Conservation of Migratory Birds* was signed. The intent of the MOU is to strengthen migratory bird conservation through enhanced collaboration and cooperation between the Forest Service and the Fish and Wildlife Service as well as other federal, state, tribal and local governments. Within the National Forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities. In early 2016, both USDA Forest Service and US Fish and Wildlife Service have agreed to extend the MOU as currently written.

The Mendocino National Forest is proposing to manage lands on the Upper Lake Ranger District located in the Dashiell, Benmore, Packsaddle, Lower Bucknell, and Upper Bucknell 7th field watersheds. Proposed management is intended to implement direction contained within the Mendocino National Forest Land and Resource Management Plan (LRMP, USFS 1995). Opportunities to promote conservation of migratory birds and their habitats in the project area were considered during development and design of the pine Mountain Late Successional Reserve Habitat Enhancement and Protection project (MOU Section C: items 1 and 11 and Section D: item 3).

Likely impacts to habitats and select migratory bird populations resulting from the Pine Mountain project have been assessed in detail within the project MIS report (USDA 2017a) and impacts to select TES birds and their habitats have been analyzed in the project BA or BE.

The Pine Mountain project will not adversely impact migratory landbird species or their associated habitats. Potential impacts to migratory species would be minimized through the adherence of LRMP Standards and Guidelines for snags and down woody debris, riparian reserve buffers, limited ground disturbance, and maintenance of canopy closure. The project is designed to improve habitat conditions through the acceleration of late-successional habitat characteristics, while still maintaining current functional habitat. Short-term impacts include the reduction of snags and coarse woody debris after initial treatment and subsequent burning. Burning is expected to create snags and downed logs but this process will happen over time. Spring and fall burning would allow for a variability for fire intensity and retention of large woody debris. Late summer and fall burns often lead to higher tree mortality and set back understory growth whereas spring burns have higher fuel moisture and may limit consumption of larger coarse woody debris. Late summer and fall burns may also create more snags than a spring burn since they tend to but also remove more coarse woody debris.

Specific project design criteria:

- Maintain all existing snags >20”DBH unless they pose a safety hazard or risk to prescribed fire control. Hazardous snags and snags >20” DBH felled to facilitate burning will be retained as CWD.
    - Within the Back Fire footprint, retain a minimum of four snags >20” DBH, unless deemed a safety hazard. If there are less than four snags per acre >20” DBH then retain the four largest snags available.

- Retain existing large CWD (>20" diameter, or largest available) up to 5-10 tons per acre.
- Within fuelbreaks:
  - Maintain one snag per quarter mile of fuelbreak,
  - Maintain CWD at one log per acre of largest available in decay class 1 or 2.
- Treatment Prescription 7 discusses mitigation measures for riparian reserves and streamside management zones.
- A LOP for northern spotted owls will be applied from February 1 – July 9 within ¼ mile of suitable nesting habitat to minimize the potential for direct or indirect take caused by smoke or noise.
  - Once protocol surveys are completed for NSO (September 2017), this LOP will only apply to occupied nesting habitat and Activity Centers.
- Due to the project's proximity to Lake Pillsbury, a LOP for bald eagle will be applied from January 1 – July 31 within a primary nest zone unless it can be determined that the bald eagles are not nesting. Primary nest zones are typically ½ mile around any known bald eagle nest.
- A LOP for northern goshawk will be applied from March 1 – August 31 within ¼ mile of active nest sites.
- A LOP for peregrine falcon will be applied from February 1 – July 31 if activities occur within ¼ mile of a known nest site.

Management Indicator Species

Management indicator species are terrestrial and aquatic plant or animal species selected on the basis of their known roles in their respective biotic assemblage or community. Many management indicator species occupy a niche in their particular assemblage that is either highly dependent on other members, or may be extremely sensitive to management related disturbance, or both. Other management indicator species were selected based on concern for their current population status. It is assumed that, with current knowledge, these management indicator species are indicative of the integrity of communities as a whole, where they serve to focus the Forest's monitoring and feedback loop, and provide an assessment of the overall health of the represented habitats/ecosystems. These species serve as the primary measure of the biological diversity trend on the Forest.

Thirteen wildlife species have been selected as management indicator species (MIS) for the Mendocino National Forest. These species are identified in the Land and Resource Management Plan (LRMP) for the Mendocino which was developed under the 1982 National Forest System Land and Resource Management Planning Rule. These MIS were selected for because their population changes may indicate the effects of management activities [36 CFR 219.19(a)(1)] and were selected and used during forest planning to help compare the effects of alternatives.

The MIS whose habitat would be either directly or indirectly affected by the Pine Mountain project, identified as Category 3 in Table 45, are carried forward in this analysis, which will evaluate the direct, indirect, and cumulative effects of the proposed action and alternatives on the habitat of these MIS. The MIS selected for Project-Level MIS analysis for the Pine Mountain project are:

Table 45. Mendocino National Forest management indicator species and the ecological elements (vegetation types, seral stages, or special habitat elements) they represent.

Species	**Status**	**Ecological Elements**	**Category for Project Analysis**[2]
Pileated woodpecker	Maintenance	Old growth[3], snags, coarse woody debris	3
Northern spotted owl	Threatened	Old growth, snags, coarse woody debris	3
Northern goshawk	Sensitive	Old growth, snags, coarse woody debris, riparian	3
American pine marten	Sensitive	Old growth, snags, coarse woody debris, riparian	3
Pacific fisher	Sensitive	Old growth, snags, coarse woody debris, riparian	3
California thrasher	Maintenance	Brushfields	3
Acorn woodpecker	Maintenance	Snags, hardwoods	3
Western gray squirrel	Harvest	Snags, hardwoods	3
Douglas tree squirrel	Harvest	Snags, true fir	3
Black-tailed deer	Harvest	Hardwoods, riparian, brushfields, meadows	3
Tule elk	Special Interest	Hardwoods, meadow, riparian	3
Bald eagle[4]	Sensitive	Riparian	3
Peregrine falcon[3]	Special Interest	Riparian, lithic areas	3

Alternative 1 – No Action

Under the no action alternative habitats for all MIS would remain on the landscape. This alternative leaves the project area at a high risk to moderate and high severity fires which may remove late successional, riparian, chaparral, coarse woody debris, and hardwood habitat types. A high severity fire would create snags for the short term but the area surrounding the snags would lack a forest structure that is also used by snag dependent species (pileated woodpecker, northern spotted owl, northern goshawk, marten, fisher, etc.). After a high severity fire most coarse woody debris would be removed, but would also be created after snags created by the

[2] 1 Category 1: MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.
Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.
Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

[3] In this context, old growth includes all late-successional stands.

[4] Bald eagle and peregrine falcon were removed from the Endangered Species List

fire fall. Again, this CWD habitat would lack a surrounding forested structure required by CWD dependent species.
In conclusion this alternative would maintain habitats for MIS species in the short-term but in the long-term could be deferential to all habitats and management indicator species.

<u>Alternative 2 – Proposed Action</u>

The proposed action would protect and enhance late successional, hardwood, chaparral, and riparian habitats. Snags >20" DBH will be retained in the project area unless they are a safety hazard or pose a risk to prescribed fire control. Snags that are felled will be retained on the ground as coarse woody debris. Coarse woody debris will be maintained at 5-10 tons per acre. Within the shaded fuel break, only one snag per quarter mile and one log per acre of the largest available will be retained.

In conclusion, the proposed action will provide for habitats for all MIS species for the long-term.

<u>Alternative 3 – No New Temporary Roads</u>

Alternative three would provide the same habitat improvements as alternative 2.

<u>Alternative 4 – No Commercial Thinning in Riparian Reserves</u>

Alternative 4 would have similar effects to all MIS habitats as alternative 2 except in riparian reserves where thinning would be less intense. Under this alternative riparian habitat would be maintained and available for use by riparian dependent species.

<u>Alternative 5 – No Commercial Thinning in Unit 3a, 19, 24b, and 33b (Northern Spotted Owl Nesting Habitat)</u>

Alternative 5 would have similar impacts as alternative 2 on MIS habitats.

Survey and Manage Species

The survey and manage standards and guidelines were developed to benefit species closely associated with late-successional and old-growth forests. Species include plant (vascular and non-vascular), fungi, terrestrial mollusk, aquatic mollusk, and vertebrate species. The survey and manage provision for each species would apply to the range (or portion of the range) of that species, to the particular habitats where concerns exists for species' persistence, and where management activities are considered "habitat-disturbing" for that species (USDA and USDI 2001).

Survey and Manage Fauna

For fauna, the project is compliant with the current survey and manage direction associated with the Northwest Forest Plan. No survey and manage fauna species occur within the Pine Mountain planning area. Survey and manage category A or C vertebrate and mollusk species exist outside the range of the project's planning area (Lauren Johnson, personal communication).

Survey and Manage Plants and Fungi

For plant and fungal species, the project is compliant with the current Survey and Manage direction associated with the Northwest Forest Plan. In keeping with direction (a) pre-disturbance surveys were conducted for those Category A or C species with ranges and potential habitat overlapping the project area, (b) measures are provided for the persistence of the species detected, and (c) management is provided for any known sites of Categories A, B, C, D or E species (Pine Mountain Botany/Survey and Manage Report 2016).

There are no known sites of category A, B, C, D, and F Survey and Manage species in the Pine Mountain project area. There is suitable habitat for two category C species (*Cypripedium fasciculatum and Cypripedium montanum)*, but no plants were found.

The Survey and Manage Category E species *Galerina heterocystis* has been recorded at an FIA plot near Benmore Creek. While it is not inside a treatment unit, and no impacts are expected, the known site will be buffered by 300-ft. and the buffered area will be monitored during project implementation to ensure that project activities in the vicinity do not negatively impact suitable habitat.

Fuels

Thinning activities, combined with the treatment of slash and natural fuels within the fuelbreaks, are proposed to reduce fire hazards in strategic locations. Fuel treatments proposed both within commercial units and within fuelbreaks are outlined in Appendix A of the DEIS, Project Specifications.

Affected Environment

Fire History

The LSRA gives Pine Mountain LSR an overall Moderate fire risk rating. It also breaks down risk into the following four hazard ratings: 191 acres of very high, 2713 acres of high, 8356 acres of moderate and 199 acres of low ratings. The risk rating was done at a watershed level and projected 1 fire every 20 years per thousand acres to get the Moderate risk rating. This fire risk rating was completed during the LSRA Analysis in 1995. Since the LSRA is over 20 years old, this data is outdated and additional analysis was conducted on fire history for this report and is discussed in the following section.

In addition to the risk rating that the LSR assessment assigned, a fire history analysis was done by the district for the purpose of this report. This assessment incorporates more recent fires not reflected in the 1995 LSR assessment. Based on available fire records, approximately 66 natural and human caused fires have occurred in or around the Pine Mountain LSR project area between 1927 and 2008. This averages to approximately 7.75 fires per decade. 16 out of the 66 fires listed were large fires (over 50 acres in size)*1 (not all of the fire burned into the project area) *2(local experience shows that fires that exceed 10 acres usually escape initial attack- see pocket card). Out of these 66 ignitions 48 were human caused, 12 were lightning caused and 6 were of unknown ignition sources. Fires that started, entered or had a reasonable chance of entering the project area (based on previous fire history or topography/vegetation) were included in the fire history table and this analysis. Fires near the project area were included if there was a good chance that the fire (had it not been suppressed) could have or did burn into the Project Area.

It is important to consider several things in regards to the fire history of the area: first being the number of fire starts that have occurred within and near the project area but were suppressed at a small size (less than 10 acres), second the number of large fires surrounding the project area, and third the current conditions that are conducive for the a potential for a large fire with high intensity effects. There are several things this brings attention to: 1) The area is far departed from its historical fire regime, 2) the lack of historically low intense but more frequent fires have created stands that are now in a condition that are ready to burn with higher severity effects to the LSR, and 3) there are many starts that could have become large fires as historical evidence shows that there has been a trend of large fires on the MNF. Many of these fires have had significant areas of moderate to high severity fire damage (see Forks, Spanish, North Pass, Mill). The conditions in the Pine Mountain project area could allow for very intense wildfires that would be a threat to the Late Successional Reserve.

In most of these large fires, portions burned at higher intensities than they would have historically under a fire regime with more frequent but lower intensity fires. Recent example of such fires are the Yolly Bolly Complex and Soda Complex in 2008 (which included the Back Fire) as well as the Hunter Fire in 2006, the Spanish Fire in 2003 and the Fork Fire in 1996. The Back Fire (part of the 2008 Soda Complex) burned within the Pine Mtn LSR and there are units proposed within the burned area. The severity of effects from these fires was likely a result of the forest's departure from historical fire regimes where fires burned more frequently but with less intensity and less damage to natural resources. The Back fire was also an early fire season burn and was not representative of the effects that a mid fire season burn would have had. The Back fire has areas of higher severity effects but less than other fires that have burned later in the summer. A burn mid fire season would likely have had much larger areas of high intensity burning than the 2008 Back fire exhibited in June. See Fire and Fuels Report (USDA 2016c)Table 4 for a comparison in weather of the Back Fire during its main burning periods vs weather conditions under 97th % weather conditions. The weather conditions were more favorable for lower fire activity than the 97th weather conditions would have been. Therefore it can be expected that if the Back Fire burned during the midst of fire season instead of in June, when conditions were milder, it would have likely burned with higher intensities. In addition, the IDT revisited the Back Fire area to reassess conditions based on 5 years post fire. The following images show the different ranges of effects from the June back fire. It is important to note that it is expected that a fire in July or August would have burned with even higher intensities. The weather observations during the Back fire are compared to the 97th percentile weather we are using in the following figure.

Potential Fire Behavior

The majority of the Pine Mountain Late Successional Reserve project area lies adjacent and upslope to the western boundary of the forest and has numerous parcels of private property within the boundary of the project area. As described in the Late Successional Reserve Assessment there is a significant threat of wildfire entering the LSR from outside the Forest, especially from the West (pA4-18) as these areas are not under Federal management. In addition to the threat from the western boundary, extensive areas of private ownership occur in and around the project. Potential ignition risk sources include human causes as well as lightning causes, the latter which ignited the Back Fire, burning approximately 1500 acres inside the Pine Mountain project area. Lake Pillsbury is a highly recreated area as well, increasing the potential for a human caused fire whether from camping, hunting or other recreation related activity. Pine Mountain Lookout is rented out to the public during the summer months, and is occupied almost daily during that time. Several dispersed camping areas occur and are used during summer months especially during deer hunting season.

Desired Condition

Guidance from the Mendocino National Forest Land and Resource Management Plan (LRMP):

Land management activities on the Upper Lake Ranger District are directed by the Mendocino National Forest (MNF) Land and Resource Management Plan (LRMP), dated February 1995. This document specifies forest-wide standards and guidelines, as well as area-specific guidelines. Information regarding fuel treatment and fire hazards can be found in Appendix D of the DEIS document.

Guidance from the Mendocino National Forest Late Successional Reserve Assessment (LSRA):

The Mendocino Late Successional Reserve Assessment describes desired conditions for stands in late-successional reserves as:

- The objective for management of late succesional reserves is to protect and enhance late successional forests to provide habitat for populations of species dependant on late successional and old growth forest ecosystems (ROD). LSRA p. 9
- Mid-to-late succesional pine, mixed conifer and hardwood stands are capable of enduring the effects of a mid-summer wildfire under normal severe conditions without setting the stad back to an earlier successional stage. (MNF LSRA p9)

- The LSRA (p. 41) describes undesirable wildfire effects as tree mortality >25%. Fuel management strategies and techniques that reduce the intensity of wildfires, limit flame lengths to less than four feet, and reduce the likeliood of crown fires would reduce tree mortality to less than 25% and maintain late successional habitat. LSRA p35
- Fuelbreaks should be constructed to provide safe access for fire suppression actions; prevent crown fires, on major ridges to reduce potential for long spotting distances; and to facilitate future prescribed burning operations.
- Underburning designed to change a fuel model 10 to a fuel model 8 would reduce flame lengths
- Moving MFRI towards a more historical level would increase the LSR’s resiliency to wildfire events. Reducing the number of acres that would experience (under wildfire conditions) flame lengths over four feet and reducing number of acres that would experience canopy fires that lead to tree mortality would help protect the LSR from potential widlfires by reducing mortality to the less than 25% goal as described in the LSRA as a desired condition.

Environmental Consequences to Fuels

Methodology

This analysis will focus primarily on fuels and potential wildland fire behavior. Several measures were used to compare action versus no action alternatives.

Mean fire return interval (MFRI) provides a quantitative measure of the role of fires as an ecosystem process. Historical MFRI was taken and compared to current conditions.

Expected flame lengths under 97th percentile weather conditions provide a quantitative measure of the expected intensity of fires within the analysis area. As discussed above fuel treatments that limit flame length to less than four feet are likely to reduce tree mortality from wildfires and also provides for the potential for direct attack suppression tactics which in turn corresponds to a better chance of more safely and effectively suppressing or managing fires. Flame lengths were calculated using the FlamMap software program. The number of acres that exhibited 4 foot and less flame lengths were compared to before and after treatment scenarios.

Expected fire type (Surface fire or Canopy fire) provides an estimate of the amount of overstory mortality that would be expected in the analysis area if a fire occurs under 97th percentile weather conditions. Fuel treatments that reduce the likelihood of fires in the canopy are likely to reduce tree mortality from wildfires. The type of fire expected was predicted using the FlamMap software program.

Direct and Indirect Effects of Alternative 1 – No Action

Effects to Potential Fire Behavior

Under the no action alternative, current potential fire behavior is high fire intensities and large areas of canopy fire activity types. This trend would increase as surface and ladder fuels continue to develop and dead fuels continue to accumulate. This accumulation of unwanted fuels would cause more acres to move towards conditions in high intensity fire behavior categories, which would continue to increase the risk to of habitat loss in the LSR and pose a risk to the public and firefighter safety in the event of a wildfire. Under these conditions, future fire suppression capabilities would be reduced and in the event of a wildfire would likely lead to more acres burned and an increased risk to not only the LRS but to communities and adjacent private lands in the area.

Effects to Potential Fire Types

Currently, 25 percent of the planning area would support surface fires, 28% of the planning area would support crown fires and 47% of the planning area would support torching. In addition, under current conditions, 78% of the area would experience flame lengths greater than 4 feet. Under the no action alternative, the vegetation and related fuel strata would continue to grow, increasing the canopy cover and the crown bulk density, both key components of determining crown fire potential. In addition, ladder fuels and surface fuels would continue to accumulate causing more of the area to move into conditions allowing for torching and crowning of trees. Both crown fires and torching burn the canopy of trees and result in mortality to the trees experiencing this fire type. Areas experiencing flame lengths greater than 4 feet will also increase as fuel loads increase.

Direct and Indirect Effects of Alternatives 2 through 5

Effects to Potential Fire Behavior

Alternatives 2 through 5 would reduce the potential fire behavior in fire activity types and flame lengths, which would decrease risk to the LSR and to public and firefighter safety in the event of a wildland fire. All four alternatives would result in decreased fire behavior and risk, however Alternative 2 would have the greatest effects in reduction. (Table 11 and 13 in the Fire and Fuels report, USDA 2016c).

Effects to Crown Fire Potential

Alternatives 2 through 5 would reduce the canopy fire potential (crowning and torching activities) in most of the project (treatment) area to the surface fire category, which would decrease risk to the LSR and to public and firefighter safety in the event of a wildland fire. Based on the fire modeling assessment, most of the project area would support surface fires post treatment (Tables 10 and 12 from the Fire and Fuels report, USDA 2016c). This would allow hand crews, equipment, and aircraft to be successful in fire suppression efforts.

These alternatives involves pile burning and jackpot burning, which always carries some degree of risk of a fire escape resulting from unforeseen factors such as adverse changes in weather. However, all treatments utilizing management-ignited fire require the development of a prescribed fire plan that must follow all Federal, State, and local laws and regulations. A well-prepared, well-executed prescribed fire plan would minimize the risk of fire escape.

Cumulative Effects to Fuels

Several projects have been completed within 2 miles of the project area within the past 20 years or are ongoing and within 2 miles of the project area. There are several other fuels projects that are ongoing to the north and south of the project. Thinning around Pine Mountain Lookout and the Elk Mountain Fuel Break thinning projects are within the project area The Howard Mill understory burn project is approximately 7000 acres of burning within the Round Fire plantations. It is adjacent to the project area with several units falling within the project area. The Willow Creek thinning project is primarily a pre-commercial thinning and fuels reduction thinning within the Round Fire Plantations. The Horse Mountain Thinning project was a commercial thinning project to the South West of Pine Mountain. The Streeter Ridge thinning project was a pre-commercial thinning project that lies between Pine Mountain project and Horse Mountain project. The Westshore fuels reduction project is just north of the Pine Mountain project.

Treated units in this project are expected to have an effect on the growth of large fires in the project area that is cumulative with previous and on-going treatment units within as well as adjacent to the project area (projects are listed above). All of these projects combined can be expected to have a cumulative reduction on the potential size of fires that are large enough to contact more than one treatment (Finney 2001).

Because of the widespread, but short-lived, impacts of emissions from fire, no other projects were considered for this cumulative smoke/emissions impact analysis. Emitted pollutants from fire do have an effect on an area, the size of which depends on atmospheric conditions at the time of the fire. Within this area, pollutants from fires can be cumulative with emissions from many sources, including other fires, vehicles, industrial sources, buildings and agriculture. It is impossible to predict what pollution sources may be present at the time of a fire occurring at some unspecified date in the future. For smoke emissions analysis see the Air Quality Report, (USDA 2016d).

Road brushing – This activity is routinely carried out by fire crews as part of road maintenance. This is not expected to cause cumulative effects within the project since it is carried out within 5 feet of roadsides and only affects brush and small trees growing within that distance.

Summary of Effects

Alternative 2 would have a substantial reduction in flame lengths greater than 4 feet and a substantial reduction in acres experiencing canopy fires versus surface fires when compared with the no action alternative. Under Alternative 2, there would be the most reduction in crown fire potential as compared with the no action alternative. Alternative 2 would have the most reduction in loss of LSR habitat in the event of a wildfire. The ability of firefighters to safely and effectively suppress wildland fire would also be improved with implementing Alternative 2. The selection of this alternative would contribute to the purpose and need, the desired condition, forest plan direction, and respond to the National Fire Plan goals of reducing hazardous fuels to modify fire behavior.

Alternative 3 (in comparison to alternative 2), assuming that commercial trees are removed, would have 0% less of a reduction in flame lengths greater than 4 feet and 0% less of a reduction in acres of canopy fires after treatment. Alternative 4 (in comparison to alternative 2) would have 13% less area experiencing <4’ flame lengths and 15% more areas experiencing canopy fires after treatment. Alternative 5 (in comparison to alternative 2) would have 1% less areas experiencing <4’ flame lengths and 2% more area experiencing canopy fires after treatment. Comparison of Alternatives 3 through 5 to alternative 2 was done to the units that are proposed to have commercial treatments only

Table 46. Overall Project Comparing Fire Activity Types (CFA)

Alternative 1/Current Conditions - FIRE TYPE (CFA- Crown Fire Activity)							
	Commercial (Treatment 3)	Fuels (Treatment 2 & 4)	Plantations (Treatment 1)	Backfire (Treatment 6)	Chaparall (Treatment 5)	Average All Treatments	Avg All Treatment w/o chaparall
Surface	18%	27%	35%	19%	24%	25%	25%
Torching	49%	43%	43%	69%	32%	47%	51%
Crown	33%	30%	22%	12%	44%	28%	24%
Alternative 2/Proposed Action - FIRE TYPE (CFA- Crown Fire Activity)							
	Commercial (Treatment 3)	Fuels (Treatment 2 & 4)	Plantations (Treatment 1)	Backfire (Treatment 6)	Chaparall (Treatment 5)	Average All Treatments	Avg All Treatment w/o chaparall
Surface	92%	84%	76%	77%	59%	78%	82%
Torching	3%	8%	12%	21%	16%	12%	11%
Crown	5%	7%	12%	2%	25%	10%	7%

Table 47. Overall Project Comparing Flame Lengths

Alternative 1 /Current Conditions - Flame Lengths							
	Commercial (Treatment 3)	Fuels (Treatment 2 & 4)	Plantations (Treatment 1)	Backfire (Treatment 6)	Chaparall (Treatment 5)	Average All Treatments	Avg All Treatment w/o chaparall
0-4	22%	21%	22%	21%	24%	22%	22%
4-8	1%	3%	5%	2%	0%	2%	3%
8-11	0%	1%	1%	1%	0%	1%	1%
11+	76%	75%	72%	75%	76%	75%	75%

Alternative 2/Proposed Action - Flame Lengths							
	Commercial (Treatment 3)	Fuels (Treatment 2 & 4)	Plantations (Treatment 1)	Backfire (Treatment 6)	Chaparall (Treatment 5)	Average All Treatments	Avg All Treatment w/o chaparall
0-4	92%	83%	70%	74%	60%	76%	80%
4-8	1%	4%	6%	1%	0%	2%	3%
8-11	0%	0%	1%	0%	1%	0%	0%
11+	7%	12%	23%	24%	39%	21%	17%

Table 48. Commercial Unit Alternatives Comparison for Flame Lengths.

Flame Length	Fireline Intensity Hazard Rating	Percent of Area No Action Alternative 1	Percent of Area Alternative 2 & 3	Percent of Area Alternative 4	Percent of Area Alternative 5
less than 4	Low	22	92	79	91
4-8	Moderate	1	1	3	1
8-11	High	1	0	1	0
11+	Very High	77	7	17	8
Total		100	100	100	100

Other treatments in the area that have been previously decided upon would be implemented.

Table 49. Commercial Units Alternatives Comparison of Fire Activity Type.

Potential Crown Fire Class	Percent of Area No Action Alternative 1	Percent of Area Alternative 2 & 3	Percent of Area Alternative 4	Percent of Area Alternative 5
Surface Fire	18	92	73	89
Crown Fire	49	4	8	6
Torching	33	5	19	5
Total	100	101	100	100

Noxious Weeds

Affected Environment

"Noxious weeds" is a category of invasive species that have been determined by the State of California to negatively impact agricultural land and wildlands. In 2003, the U.S. Forest Service identified invasive species, which includes noxious weeds, as one of four critical threats to the nation's ecosystems. Invasive species can be aggressive invaders of native plant communities and are capable of dominating native habitat types, excluding native vegetation and their pollinators, depleting soil and water resources, and reducing site diversity and productivity. In light of their high reproductive rate, growth habit, methods of dispersal, and long-lived seed bank capacity, invasive species are opportunistic, aggressive colonizers that readily out-compete and displace native plant species. Once introduced and established, invasive species can persist in the environment indefinitely. By altering native plant communities, invasive species displace forage for livestock and native wildlife, and ultimately homogenize grassland species composition.

Habitats vulnerable to introduction and spread of invasive species are those subject to disturbance where canopy, understory and ground vegetation have been removed. Invasive species have an enormous capacity to spread into these newly disturbed areas and to proliferate. Inadvertent weed introductions are often caused by weed seed imported on equipment or on vehicles that have been operating in an infested area, by using weed-seed-infested gravel or other material, or by seed attachment on the hide of livestock and native ungulates. Introduced weed seed that is exposed to disturbed soil readily germinates, and if left untreated, becomes established and spreads where conditions are suitable. Once established, invasive species can spread from roadside occurrences to interior habitats and, overtime, affect biodiversity on the landscape scale (Von der Lippe and Kowarik 2007).

Noxious Weeds in the Planning Area

Surveys conducted in 2014 determined that there are occurrences of cheatgrass, yellow starthistle, medusahead, and bullthistle scattered throughout the project area, primarily along unshaded roadsides and in open grasslands. Areas within the 2008 Back Fire with high canopy loss have shown a flush of non-native species establishment. There are no Class A weeds in the project area.

Environmental Consequences for Noxious Weeds

The environmental consequences of noxious weed introduction and spread are discussed in terms of indirect effects only in that the effects are an aftermath or consequence of establishment. Indirect effects pertain to the introduction and spread of weeds and the resultant incremental loss of native plant species, which reduces the capacity of plant communities to provide ecological services—forage for wildlife, water and nutrient cycling, and soil productivity.

Direct and Indirect Effects of Alternative 1 – No Action

Under the no action alternative, there would be no effects brought on by project implementation. Even without new canopy removal, ground disturbance, and clearings, weeds such as yellow starthistle may still be introduced to the area and if left unchecked existing occurrences would spread from their source. Given the circumstances described above about the current distribution of weeds within the planning area and the potential vectors for weed spread outside the scope of this project (i.e., routine road maintenance, private property developments), the extent of noxious weed populations would increase. Weeds would spread away from existing occurrences via vehicles, livestock, and off-highway vehicle travel, especially in areas where there is reduced vegetative competition and lowered canopy cover. Infested areas with low canopy cover and areas where infestations occur along roadsides would remain as source areas for the aforementioned vectors to continue weed spread and proliferation.

Direct and Indirect Effects of Alternatives 2 through 5

Indirect effects under all action alternatives include the risk of spread associated with the use of heavy equipment to maintain roads, construction of 0.25 miles of new temporary roads (Alternative 2, 4 and 5) and redevelopment of landings. These activities create a high risk of spread of weeds in the planning area. Machinery and vehicle use in infested areas might directly spread existing weed infestations to currently uninfested areas.

Thinning proposed in stands would maintain a range of canopy cover from an average of 40 percent in early-mature stands to 60 percent in older stands. Overstory canopy removal, understory vegetation removal, soil disturbance, heavy equipment use, import of foreign material, and the proximity of known weed sites to ground-disturbing activities are all factors that influence the risk or likelihood of weed introduction and spread. Variables surrounding these factors pertain to their extent and magnitude.

New landings are proposed for all of the action alternatives. Landings are often sites for noxious weed introduction and establishment. Creation of new landings essentially exacerbates the situation.

Fuelbreak activities would be essentially the same for all action alternatives and therefore carry the same risk of spread and introduction. Handwork carries with it a risk of spread of existing weed populations if activities are conducted within existing infestations. Handwork itself inherently carries with it a lower risk of long-distance spread of noxious weeds than does machine work (e.g., mastication equipment). Fuel treatments in the understory of mature stands would leave patches of shrubs and trees scattered throughout the unit. The retention of shade and pockets of competing vegetation in the unit as a result of thinning and fuels treatments lowers the risk or reduces indirect effects of these activities on the spread of noxious weeds into the unit to a negligible level.

Project design features have been put in place for all action alternatives to reduce the risk of noxious weed introduction and spread (see design features, Appendix B). Noxious weed control measures that would be undertaken to decrease the risk of introduction and spread include a progression of work scheduled in the operation plan and site treatment by mechanical means (i.e., weed whacker or hand pulling).

Cumulative Effects to Noxious Weeds

The spatial context for cumulative effects analysis coincides with the planning area and the private lands or adjacent to the planning area that connect to the planning area by a road. In keeping with the spatial scale, the temporal context for assessing past activities would coincide with the timing of those activities occurring within that spatial context.

In general, past activities associated with a) regeneration treatments and other logging practices, b) high-intensity wildfire, c) landing developments, d) road maintenance activities, e) livestock grazing, and f) residential or agricultural related clearings on private land have contributed cumulatively to the introduction and spread of noxious weeds. Forest Service projects, specifically road-related operations and fuelbreak treatments in infested areas, or equipment use in infested areas as well as ongoing developments on private land, would continue to exacerbate the current condition. Like past activities that provided vectors and created suitable habitat for weed establishment (i.e., little to no overstory, disturbed ground, little competing vegetation), foreseeable future activities would be expected to continue this trajectory.

Treatment Techniques

Design criteria included in the proposed Action intended to reduce the risk of week introduction and expansion are:

- Include in all contracts a provision for equipment cleaning to reduce the introduction of noxious weeds.
- Where equipment and vehicles need to use roadsides near week infestations, either flag the infestations for avoidance or manually remove all aboveground weed biomass.
- Monitor roadsides, dozer-piled burn piles, landings, and thinning units for changes in weed occurrences for at least three years after treatments are completed. Implement weed control practices when necessary.
- If seeding is needed on any decommissioned roads, landings, or heavily used skid trails, use native species and/or non-persistent/sterile cereal grains. As an alternative to seeding consider covering exposed soils with litter from adjacent undisturbed sites.
- Mulch burn pile “scars” with litter and small woody material from the surrounding area.

Watershed Resources

The purpose of this section is to characterize hydrology resources of the Pine Mountain Late-Successional Reserve Habitat Protection and Enhancement Project area and analyze any potential effects from implementing the no action and action alternatives. In addition, cumulative effects from the proposed action, as well as ongoing, future and past actions are quantified using the Equivalent Roaded Acres (ERA) method.

Potential effects to hydrology resources include impacts to water quality, riparian reserves, and cumulative watershed effects.

Methodology

The analysis of alternatives is based on field observations (including surveys) and an assessment of the Cumulative Watershed Effects (CWE) resulting from activities planned or expected to occur under each of the alternatives.

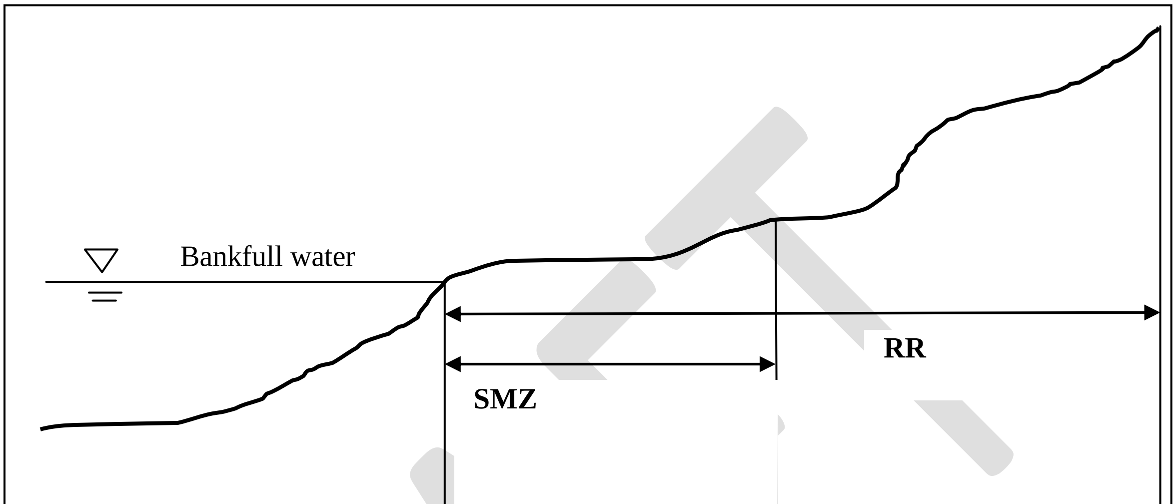
Spatial boundaries for the CWE analyses include 7^{th} field (HUC 14, approx. 3,500-8,000 acres) and 8^{th} field watersheds (HUC 16, approx. 1,500-2,500 acres). Temporal Bounding of the CWE analysis considers all ground-disturbing activities in the past (up to ten years prior), present, and reasonably foreseeable future.

Affected Environment

The Planning area is approximately 10,200 acres, encompassing public and private lands within the border of the Mendocino National Forest (MNF). The project is located within the Dashiell, Benmore, Packsaddle, Lower Bucknell, and Upper Bucknell 7^{th} field watersheds.

The majority of streams within the project area are low-order (1-3) intermittent and ephemeral streams with gradients of 10% or higher and side slopes greater than 45%. These lower order streams support little to no phreatophytic vegetation. True riparian vegetation, where it exists, is limited to about five to ten feet from the channel. These streams are typically step-pool systems with bedrock and boulder stream beds. They are vertically stable and are not very sensitive to changes in land use.

Portions of Benmore and Packsaddle Creeks, as well as an unnamed tributary to Packsaddle Creek, are perennial within the project boundary. These streams tend to have over-steepened and unstable side slopes with high sediment loads in the upstream portions. Packsaddle and its tributary flow into Lake Pillsbury, while Benmore Creek flows directly into the Eel River. Although Benmore Creek has elevated sediment levels due to natural instabilities, it supports Steelhead for approximately its lower 2 miles.



RR and SMZ width for each streamclass:		
Streamclass	Riparian Reserve Buffer	StreamsideManagement Zone Buffer
Perennial	300’	The greater of 100’ slope distance or to the slope break
Intermittent	150’	The greater of 50’ slope distance or to the slope break
Ephemeral	100’	20’ (non-anadromous)
		50’ (anadromous)

Figure 8. Riparian Reserve and Streamside Management Zone classification

The project area encompasses about 5,105 acres of Riparian Reserves (RRs) and 1,876 acres of Streamside Management Zones (SMZs). RRs and SMZs constitute a hierarchy of areas designated to protect water quality, aquatic and riparian habitats(Figure 8). The highest level of protection occurs within the SMZ, where no ground-based mechanized equipment is allowed to operate except at designated crossings.

Environmental Consequences

Direct, indirect, and cumulative effects of the action alternatives (2 through 5) are fairly similar. It is assumed that these effects would be short term.

Alternative 1 – No Action

Direct Effects and Indirect Effects

Direct and indirect effects associated with not treating the units and roads in the project would result in continued sedimentation from roads and further accumulation of forest material; increasing the potential for catastrophic fire.

Cumulative Effects

The analysis of No Action Alternative is the same as the existing condition. Analysis of the No Action Alternative indicates that potential for cumulative effects is minimal to moderate.

Alternatives 2 through 5

Direct Effects and Indirect Effects (Summary)

Table 50. Direct and Indirect Effects summary of watershed effects

Alternative	Direct and Indirect Effects
2	Temporary effects due to removal of vegetation, slash piling, creation of temporary roads, and burning. Use of heavy equipment may affect soil compaction.
3	Similar effects as Alt 2, but less potential negative effects because 0.25 mile of temporary road would not be created. May have indirect effect of needing to use more skid trails to haul out timber.
4	Similar effects of Alt 2, but less disturbance within Riparian Reserves. Indirect effect would include the exclusion of heavy fuels removed from RR's , which can lead to negative soil and watershed effects in an event of a wildfire.
5	Similar effects of Alt 2, but less disturbance within known Norther Spotted Owl nesting sites. Indirect effect would include the exclusion of heavy fuels removed from these areas, which can lead to negative soil and watershed effects in an event of a wildfire.

Cumulative Effects

All alternatives proposed as part of this project do not exceed the "Threshold of Concern" when analyzed with the Cumulative Watershed Effects model. Each alternative approaches the threshold at varying levels (Table 51).

Table 51. Watershed Cumulative Effects.

Watershed	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Willow	1.56	1.66	-	-	-
Packsaddle	2.31	4.11	-	3.66	4.09
Upper Bucknell	1.48	2.32	-	2.13	-
Lower Bucknell	1.23	2.28	-	2.15	-
Benmore	4.14	7.75	7.74	5.99	7.56
Dashiell	1.8	2.2	-	2.14	-
"-" denotes same value as Alternative 2 All analysis results remain below Threshold of Concern of 12%					

Summary of Effects

The effects resulted from all alternatives proposed in this project do not exceed the Threshold of Concern. While some alternatives may have less of a cumulative effect, there may be negative indirect effects as a result. Alternative 1 has the least cumulative effects, but is the most susceptible to catastrophic wildfires. Similarly, Alternatives 4 and 5 will have less of a cumulative impact compared to Alternative 2, but do not address the heavy fuels problem in the excluded treatment areas. Alternative 2 would have the most cumulative effects (though not above threshold), but will have the most impact in reduction of fuels; thus reducing the possibility of catastrophic wildfires.

Compliance with law, regulation, policy, and the Forest Plan

Compliance for this project include: Clean Water Act (1977), Executive Order 11988 (Floodplain Management,1977), National Forest Management Act (1976), Mendocino National Forest Land and Resource Management Plan (1996), Porter-Cologne Water Quality Control Act (1999), Executive Order 11990 (Protection of Wetlands, 1977) . The following were excluded because they are not affected by the project or do not apply:, Coastal Zone Management Act (1972; 16 USC 1451), Wild and Scenic Rivers (1508.27 (b)(3)).

Geological Resources and Hazards

Affected Environment

Underlying geology known as the Franciscan Assemblage greatly influences the Pine Mountain project area's topography. The Franciscan is composed primarily of metamorphosed coarse grain greywacke and marine sedimentary rocks, including fine-grained siltstone. These rocks are broken up and weak, creating an environment susceptible to landslides. In fact, mapped dormant landslides make up 3,188 acres or almost 40% of all project units. Generally, dormant landslides are defined as over four-hundred years old in age. The majority of dormant slides were likely last active in the Pleistocene when the climate was much wetter and the geology more tectonically active. More recent slope failures (younger than four hundred years) are active landslides. Active landslides, per the Northwest Forest Plan's Aquatic Conservation Strategy, and the Mendocino National Forest's Land and Resource Management Plan, are riparian reserves and must be managed to prevent human induced failures and maintain or enhance woody debris. Known active landslides cover 70 acres within unit boundaries. Other locations where active landslides are very common are along the inner gorges. Inner gorges are immediately adjacent to streams and have slopes of 65% and up. Inner gorges form by rapid downcutting by streams which results in oversteepened, unstable banks that are prone to mass wasting and debris flows.

Environmental Consequences

With **Alternative 1**, the no action alternative, existing environmental trends would continue. These trends include high densities of conifers, continued declines in oak stands and high fuel loading. These three existing trends increase the risk of high severity and high intensity wildfire with a high likelihood of tree torching and crown fires. As seen on the Mendocino National Forest in the burn areas of the Mill Fire and North Pass fires, landscape-scale wildfire resulted in reactivated deep-seated landslides and shallow debris slides with a higher frequency of stream bank failures. These results would be expected if a wildfire burned throughout the Pine Mountain project area and especially in steeper lands adjacent to inner gorges.

Alternative 2 is the proposed action and its actions include fuels reduction and management specific to habitat protection and enhancement with emphasis on Northern Spotted Owl. Treatments, including commercial thinning of trees, mastication, and prescribed fire, would significantly reduce the risk of high severity and high intensity wildfire thus reducing the risk of post-fire landsliding. Geology design features would exclude mechanical treatments in unstable riparian reserves, which means a higher proportion of trees and potential large woody debris would be retained and no mechanical ground disturbance would occur. Furthermore, treatments in riparian reserves are designed to meet Aquatic Conservation Strategy objectives. For example, treatments in uplands and riparian areas would drive stand densities closer to what is thought to be pre-European management, with less contiguous canopy cover and much lower fuel loadings resulting in less tree torching and canopy fires (Darner, 2016). In addition, release of dominant, co-dominant conifers and shaded out oaks would result in increased vigor and potentially increased root health and root cohesion. Increased root cohesion would, especially in lands steeper than 35%, increase stability and reduce the risk of shallow landslides. The deep root systems of currently shaded out oaks would be capitalized upon, potentially increasing soil and bedrock stability. Increased vigor would result in larger trees for large wood debris recruitment.

Alternative 2also includes reconstruction of 3.2 miles of temporary road and construction of 0.12 miles of temporary road. Reconstruction would have no negative effect on landsliding as no new cuts would be made. Beneficial effects may include the prevention of road-related landsliding through maintenance of an otherwise abandoned road prism. New temporary road construction would require new cuts but lands within the 0.12 mile alignment are relatively gentle at less than 35% in an area with no mapped dormant or active landslides. Therefore stability of lands are not expected to be impacted by the proposed temporary road. The temporary road would also provide access to the bottom of unit 14 and the top of unit 13, potentially reducing skid distances and reduce the number of times skid trails are used thus benefiting soils with reduced disturbance and compaction.

Finally, alternative 2 includes the decommissioning of four roads including a segment of 17N35. Road 17N35 has two culverts with fills that are vulnerable to failure during extreme climactic events. Removal of the fills and placement of fills against the existing road cuts about 300' away from streams would be a more stable, long-term method of removing the threat of fill failure. While 17N35 is mapped at the bottom of a dormant landslide, there are no signs of active mass wasting. Decommission of the other three roads would mostly be a benefit to soils and reestablishing drainage of seeps and springs into swales instead of running down forest roads and contributing road derived sediment to nearby drainages. These three roads are primarily aligned along ridges and have very little fill to remove. A few of the roads can simply be barricaded with no other action as a suitable decommissioning. With application of geology mitigation measures and design features, there would be a net beneficial cumulative impact by reducing the risk of human management related landslides.

Alternative 3 excludes reconstruction and construction of the temporary road between units 13 and 14 but otherwise retains all other proposed actions. Since the road would not be reconstructed, areas where water concentrates on the road would not be resolved. Water would continue to be delivered to hillslopes that may, over time, result in gullying and even mass wasting. Therefore, mitigation measures for Alternative 3 include hydrologic stabilization of the existing prism.

Alternative 4 would include all actions of alternative two but would prohibit commercial thinning of trees in riparian reserves. The roughly 700 acres of riparian reserves, distributed throughout the project area, include unstable areas, perennial, intermittent, and ephemeral drainages. The Northwest Forest Plan and the LRMP define these riparian reserves and most of their buffers. For example, perennial streams have a buffer of 300 feet on each side. This alternative would maintain larger trees at potentially close spacing with closed canopies, but would still allow thinning of smaller trees competing for soil resources. This alternative would generally benefit land stability within riparian reserves with greater tree retention and possibly releasing these trees by thinning smaller trees. However, dominant trees may continue to feel stresses from nearby large trees and those important, soil-stabilizing trees, may suffer mortality. Torching and crown fires in riparian reserves would be more likely over the 700 acres (see Pine Mountain Fire and Fuels Report, USDA 2016c) thus elevating the risk of landsliding in upland areas and riparian reserves, including inner gorges as compared to alternative 2. The widespread nature of not commercially thinning on 700 acres of riparian reserves also means that a more contiguous high intensity fire could occur, and spread into uplands, which would increase the risk of new deep-seated landsliding and reactivated deep-seated landsliding. More potential large woody debris would be maintained in riparian reserves but they may not be enhanced with growth and may be more likely to burn in a high intensity wildfire.

Alternative 5 would include all actions of alternative two but would not allow commercial thinning of trees in defined units known to have Northern Spotted Owl nesting habitat. These areas, at about 60 acres, would maintain canopies that may be closed and may be more prone to carrying fire. Spacing of large trees would be maintained, thus these trees would continue to compete. In general, retaining more trees would benefit areas prone to instability. Major root structures would be retained as would the vast majority of evapotranspiration where these trees dominate. High intensity fire is likely with continued overstocking of trees and related continuous canopy (Darner, 2016). High intensity fire and related tree mortality are likely to result in new unstable areas or reactivation of dormant landslides. With climate change, wildfire risk is likely to increase with prolonged and potentially more intense drought. Competition of trees for resources would continue and vigor of tree roots and evapotranspiration would be suppressed in the long term. However, the approximate 60 acres of the affected units is very small compared to the overall project making the aforementioned potential impacts minor and localized.

Air Quality

Affected Environment

Air quality is managed through a complex series of Federal, State, and local laws and regulations designed to assure compliance with the Clean Air Act. The criteria pollutants that would be released are i.e. PM_{10}, $PM_{2.5}$, Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Volatile Organic Carbons (VOCs) with minute quantities of non-criteria air toxics. These criteria pollutants and air toxics are considered unhealthy for the public. In addition, greenhouse gases like Carbon Dioxide (CO_2) and Methane (CH_4) are also emitted.

For air quality management, California is divided into fifteen air basins whose boundaries are based on geographical and meteorological considerations and follow political boundaries to the extent practicable.

The majority of the project area falls within the Lake County Air Basin and is managed by the Lake County Air Quality Management District (LCAQMD). Approximately 70 acres of the project falls within the Mendocino County Air Quality Management District (MCAQMD). The proposed Pine Mountain project area lies mostly within the Lake County Air Basin with 70 acres in the North Coast Air Basin. The nearest Class I Airshed is approximately 30 miles to the North in the Yolla Bolly Wilderness. The elevation of the project area ranges from 1,548 feet to 3,971 feet and is approximately 15 miles north of the community of Upper Lake, approximately 5 miles east of the communities in and around Potter Valley and 4 miles south of the communities around Lake Pillsbury.

The Air Pollution Control or Air Quality Management Districts have the primary responsibility for meeting the requirements of the Clean Air Act. The Pine Mountain Project would be administered by the Upper Lake Ranger District of the Mendocino National Forest. This responsibility is carried out through the development and execution of implementation plans, which must provide for the attainment and maintenance of air quality standards. Air quality rules and regulations for Lake County Air Quality Management District can be found at their web site at http://www.lcaqmd.net/ and for Mendocino County Air Quality Management District at http://www.co.mendocino.ca.us/aqmd/index.html.

Air Quality Regulatory Framework

Air is managed by a complex network of regulations. A complete discussion of the regulatory framework can be found in the Air Quality Report (USDA 2016d). The network of regulations was initiated in 1963 by the Air Quality Act and then followed by Clean Air Act Amendments in 1970, 1977, and 1990. Under the 1970 amendment, Environmental Protection Agency (EPA) was required to develop primary Ambient Air Quality Standards to protect human health and secondary standards to protect welfare. Additional amendments provided additional protection.

States have direct responsibility for meeting requirements of the Federal Clean Air Act and corresponding Federal regulations. California passed a Clean Air Act in 1988. The act added several requirements concerning plans and control measures to attain and maintain the state ambient air quality standards. California developed a State Implementation Plan (SIP) that identified how the state would meet standards. The Forest Service is required to comply with all requirements of the CA SIP.

Environmental Consequences

Direct and Indirect Effects of Alternative 1

Under this alternative, no treatments would occur, and there would be no emission contribution for air quality degradation. This would lead to increased accumulation of ground fuel, leading to the potential for increased high-intensity wildfires in the future. Wildfires present a risk to the public health and result in damage to both the environment and property. Wildfires are known to result in high levels of emissions and associated NAAQS violation and decreased visibility.

If a wildfire were to occur, the potential indirect effects include degraded air quality and reduced visibility. Consumption of the increased fuel loads and understory biomass would increase the amount of smoke emissions. These emissions would also occur over a period of a few days to several weeks as opposed to intermittent days over several years for a prescribed fire project.

Alternative 1

Direct Effects

There would be no direct effects to air quality from the no-action alternative because no treatments would occur.

Indirect Effects

Under this alternative, no treatments would occur and there would be no emissions contributing to air quality degradation. This alternative could lead to increased accumulation of ground fuel due to insect and disease activity and natural forest succession. The accumulation of ladder and ground fuels may lead to an increased probability of high intensity wildfire in the future, which could result in air quality degradation. Research indicates wildfires can produce nearly twice the amount of smoke as prescribed fire (Huff et al. 1995). Air quality can be degraded by smoke from wildfires to the point of human illness in some instances. Hardy (2001) noted emissions from wildfire are typically greater than emissions from a prescribed fire on the same acreage due to greater emission factor, fuel consumption, and fire intensity. Wildfires are also known to result in high levels of emissions. Smoke from wildfire can cause visual impacts to the surrounding area and create hazardous driving conditions on adjacent state, county, and Forest Service roads for extended periods of time. In the short-term air quality impacts from alternative 1 would be less because prescribed burning and pile burning would not occur. If a wildfire were to occur, the potential indirect effects include degraded air quality and reduced visibility. Consumption of the increased fuel loads and understory biomass would increase the amount of smoke emissions. These emissions would also occur over a period of a few days to several weeks as opposed to intermittent days over several years for a prescribed fire project.

Cumulative Effects

Cumulative effects of smoke are unknown because the intensity and size of a potential wildfire is unknown.

Alternative 2, 3, 4 and 5

Direct and Indirect Effects

Prescribed fire operation generally release significantly less pollutants than an uncontrolled wildfire would under the no-action alternative. Emissions from a prescribed burn can be managed better than emissions from a wildfire and mitigation measures are used during prescribed burning operations to reduce emissions impacts. Smoke may settle in drainages during the evening hours following ignition. It is expected treatments would decrease fire intensity, severity and emissions should a wildfire occur in the project area after treatment. All burning activities would be in accordance with Federal, State, and local guidelines as administered by the Lake County Air Quality Management District and the Mendocino County Air Quality Management District. No significant impacts to any class 1 Areas or sensitive receptor are expected. The amount of emissions released would not change significantly during prescribed burning operations when comparing alternatives 2, 3, 4 and 5. However, alternative 2 would have a greater impact on reducing the amount of emissions expected if a wildfire were to occur after treatment.

After implementation of treatments, subsequent wildfires in the project area would produce significantly less pollution than they would in the no-action alternative. See Table 52 for emissions modeling summary.

Table 52. Emissions Comparison, Tree Vegetation Type

Fire Type	PM_{10} (pounds/acre)	$PM_{2.5}$ (pounds/acre)	CO_2 (pounds/acre)
Wildfire (Summer) Before Treatment/Alternative1	4467	3786	255526
Wildfire (Summer) After Treatment/Alternative2	2589	2195	148475
Prescribed Fire (Fall) 1st Entry	2340	1983	125841
Prescribed Fire (Fall) Further Entry	1051	890	57243
Prescribed Fire (Spring) 1st Entry	1903	1613	101219
Prescribed Fire (Spring) Further Entry	807	684	44100
Pile Burning (Fall)	2732	2315	199130
Pile Burning (Spring)	2185	1852	158315

Cumulative Effects

Cumulative effects on air quality as a result of the implementation of alternative 2 would have the greatest decrease in air quality pollutants being released from a wildfire. Emitted pollutants from fire have an effect on an area depending on atmospheric conditions at the time of the fire. Pollutants from fires can be cumulative with emissions from many local and regional sources, including other fires, vehicles, industrial sources, and agriculture. Because of the widespread and short-lived impacts of emissions from fire, no other projects were explicitly considered for cumulative impact analysis. It is impossible to predict what pollution sources may be present at the time of a fire occurring at an unspecified date in the future.

The Lake and Mendocino County Air Quality Management Districts regulate permissible burn days for prescribed fire use within their respective districts and because of the regulations in place, emissions generated from implementation of the project are not expected to exceed Federal and State air quality standards. The improved wildfire suppression characteristics created by combined thinning and fuel treatment activities should lead to a reduction in size and intensity of wildfires in the treated areas. In the long term, the emissions from wildfires are expected to be reduced as a result of reduced fuel loading.

Emissions Summary
Prescribed fires only occur with the approval of the appropriate air pollution control district, in this instance, the Lake and Mendocino County Air Quality Management Districts. Approval from the Air District is dependent on the expected emissions not causing air pollution levels to exceed the threshold where they would have an adverse effect. This regulation minimizes the potential for significant adverse effects resulting from the cumulative impact of pollutants from prescribed fires. During prescribed fires, smoke management and air quality will be closely monitored so that burning can be carried out under conditions that allow for minimizing impacts to smoke-sensitive areas and for favorable smoke dispersion.

The proposed action would have the direct effect of releasing pollutants into the air during prescribed fire operations. Prescribed fire operation would release significantly less pollutants than a potential wildfire under the no-action alternative would. Duration of smoke can be better managed through mitigation measures during a prescribed burn than a wildfire. Smoke emissions are more controllable during a prescribed fire than a wildland fire event.

If a wildfire were to occur, the potential indirect effects include degraded air quality and reduced visibility. Consumption of the increased fuel loads and understory biomass would increase the amount of smoke emissions. These emissions would also occur over a period of a few days to several weeks as opposed to intermittent days over several years for a prescribed fire project.

Transportation System

The following discussion provides a description of current road conditions in the planning area, management direction for road maintenance, temporary roads proposed under Alternatives 2, 4 and 5, and road decommissioning.

Affected Environment

This planning area contains 73 miles of system and county roads (Table 53).

Table 53. Transportation system, Pine Mountain planning area

Road Type	Miles
Forest System roads	72
Forest nonsystem roads	0
County roads	1
Surface	
Asphalt or chip-seal	0
Rock surfacing	11
Native surface	61

Road Type	Miles
Maintenance Levels*	
Level 4	0
Level 3	9
Level 2	29
Level 1	34

*See glossary for maintenance level definitions

The Pine Mountain Late-successional Reserve Habitat Protection and Enhancement Project has 30.1 miles of roads in the action area (different from planning area). Road treatments are proposed to occur on approximately 19.3 miles of roads that occur within the action area. The remaining 10.8 miles of roads in the action area will remain undisturbed and will not add to the effects of the roads actively used during project implementation. There is a seasonal closure of Forest Road No.18N05 (Pine Mountain Road), from County Road 301, then south to its terminus at the M8 Road. Consequently, all roads stemming off of 18N05 are also closed.

Road-related Issues and Evaluation Criteria

The current road system was built to access timber and other forest resources. Timber sale revenues funded the majority of past construction and road maintenance. Road maintenance funding has declined with reduced timber harvest. Reduced road maintenance could result in varying degrees of resource damage.

Surveys for road Hydrologic Connectivity were performed within boundaries of the Project Area in 2015; most road segments were surveyed (

Table 54). The purpose of this analysis is to determine what percent of the road network is directly connected to the stream system and delivering sediment without the filtering effect of a buffer strip.

Table 54. Road Connectivity within Project Area

Road	Total Length (ft)	Connection (ft)	% Connected
17N23	13592.78	2704	20
17N23A	2989.9	568	19
17N35	11499.9	6064	53
17N40	6264.3	5120	82
17N45	5252.7	787	15
18N05	34029.6	14248	42
18N05E	1050	0	0
18N05J	2175	207	10
18N05M	2150	312	15
18N05N	660	0	0
18N05P	2159	713	33
18N29	20701	2046	10

Road	Total Length (ft)	Connection (ft)	% Connected
18N37	4468.8	845	19
18N69	10908.7	0	0
18N69A	1132.3	0	0
18N69B	4439	413	9
18N69C	1254.7	100	8
18N70	8421.2	2231	26
18N77B	1987.3	1589	80
17N72A	476	286	60
17N72	6891.9	2527	37
17N72B	1429	554	39
17N73	14779.1	5469	37
Total	**158,712.18**	**46,783**	**29.48 (avg)**

Several roads within the project area have been “storm-proofed”, in other words: bladed, outsloped where possible, and had drainage structures cleaned out. These activities have reduced the amount of sediment entering project area streams and have restored hillslope drainage to a more natural state. Overall road connectivity within the Project Area is about 29%.

Environmental Consequences

Temporary Road Construction

Alternative 2, 4 and 5 proposes 0.25 miles of new temporary road construction. There are no proposed new temporary road construction under Alternative 1 or 3.

Temporary System Roads

For all action alternatives, a total of approximately 1.14 miles of system road segments would be decommissioned. For any temporary roads used, culverts and other drainage structures would be removed and drainage terrain features restored. The disturbed area would be scarified, mulched with woody debris or weed free straw, seeded where needed, and entrances blocked with earth or rock barriers to prevent vehicle travel. System roads to be decommissioned are shown in Table 65.

Road Maintenance

Project implementation would have a positive effect whereby providing a funding mechanism to maintain these roads, improving the existing condition, thus reducing adverse environmental effects. Road maintenance would improve road conditions of some roads, and prevent damage to roads used for this project.

Road surfaces would be maintained at the minimum level for the vehicle and use they are designed for. Ditches, culverts and other drainage structures would be kept open and functioning. Roadside slash that could obstruct water flow, particularly in ditches and at culvert inlets, would be removed.

Dust abatement would be required on system roads when hauling. Water fill sites would be protected. A spill prevention kit would be stored at fill sites, or carried in water tenders. On fish-bearing streams and where needed, all pump inlets would contain the appropriate sized screens to protect fish and other aquatic resources.

Equipment would not operate when ground or road conditions are such that damage to National Forest resources could occur. Harvest operations would be suspended if monitoring reveals an immediate threat of resource damage (such as excessive soil compaction or soil displacement).

Wet weather operations would be continually monitored by the purchaser and the Forest Service representative, to identify any changed conditions. If detrimental effects to the transportation system, water quality, or soil resources occur, the Purchaser and Forest Service would develop actions necessary to alleviate adverse effects or suspend operations.

Public Safety

There are some older dead or excessively leaning live hazard trees along the roads. The timber sale contract would require felling and possible removal of roadside hazard trees and roadside brushing before hauling begins.

During implementation of this project, all contractors would be required to have roads signed at appropriate intersections, and in the immediate areas of current operations. Flaggers may be required when felling trees that could reach a road, or yarding trees across a road.

Cultural Resources

Introduction

The Upper Lake Ranger District, Mendocino National Forest, is responsible for the stewardship of the cultural resources located on the lands within its scope of management. This management responsibility includes a wide variety of archaeological sites, buildings, structures, objects, and cultural landscapes. The District also manages natural resources which are critical to the continuation of the lifeways of indigenous peoples. Preserving for future generations the important cultural, educational and scientific values of these nonrenewable resources is a Federal Agency responsibility. The Proposed Action and alternatives were designed to ensure compliance with federal historic preservation laws, and management strategies developed to balance resource protection, cultural values and recreation opportunities. Once damaged or destroyed, historic properties cannot be repaired or replaced.

<u>Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction</u>

Direction relevant and specific to the alternatives as they affect cultural resources includes:

National Historic Preservation Act (NHPA), 1966 (as amended)

The Forest Service is directed to identify, evaluate, treat, protect, and manage historic properties by several laws. In 1966, Congress declared it to be our National policy that the federal government “administer federally owned, administered, or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations” (*National Historic Preservation Act* [NHPA] (54.54 U.S.C. 300101)).

Chapter 12 The NHPA of 1966 performs five actions: 1). It extends the policy in the Historic Sites Act of 1935 (49 Stat. 666; 16 U.S.C. 461-467) to include resources that are of State and local significance; 2). It expands the National Register of Historic Places (NRHP); 3). It establishes the Advisory Council on Historic Preservation (ACHP) and State Historic Preservation Officers (SHPO); 4). Establishes other organizations and programs; and 5). It outlines the historic preservation responsibilities of Federal Agencies.

Chapter 13 NHPA Section 106 directs all federal agencies to take into account effects of their undertakings (actions, financial support, and authorizations) on properties included in or eligible for the National Register. The ACHP regulations (36 CFR 800) implement NHPA Section 106. NHPA Section 110 sets inventory, nomination, protection, and preservation responsibilities for federally-owned historic properties.

Executive Order 11593: Protection and Enhancement of the Cultural Environment, issued May 13, 1971

Directs federal agencies to inventory cultural resources under their jurisdiction, to nominate to the NRHP all federally owned properties that meet the criteria, to use due caution until the inventory and nomination processes are completed, and to assure that federal plans and programs contribute to preservation and enhancement of non-federally owned properties.

Region 5 Programmatic Agreement (2013 RPA)

Provides streamlined procedures for complying with Section 106 of the NHPA (36 CFR 800.14(b)). In California (Region 5) the Forest Service has developed this Programmatic Agreement (PA) between the SHPO and the ACHP which developed classes of activities as exempt from or subject to minimal review for undertakings with little potential to cause effects to historic properties. Numerous additional standard protection measures (SPM) were also added including on-site SPMs (Class II) and historic structure treatment SPMs (Class III) for projects on National Forest System lands. Numerous other streamlined procedures are subsumed under the 2013 RPA including expedited evaluation protocols for certain kinds of cultural resource types, and the *Region 5 Hazardous Fuels Protocol for Non-intensive Inventory Strategies for Hazardous Fuels and Vegetation Reduction Projects* (2013 RPA Appendix H).

As set forth in the Region 5 Section 106 Compliance Programmatic Agreement, (USDA 2013), archaeological sites that have been evaluated and found to be significant under the National Register of Historic Places Criteria (36CFR60.4) or sites that have not yet had their significance determined, will be protected from project activities and potential damage that could be inflicted by the implementation of the project. Within the Pine Mountain project boundaries, two archaeological sites have been evaluated using the National Register criteria (FS# 05085400099 & 05085400260) and were determined not eligible for listing and require no protection measures. All of the twenty-six other identified sites are considered potentially eligible. They will all be protected until such time as an eligibility determination can be made.

The Region 5 Hazardous Fuels Protocol for Non-Intensive Inventory Strategies for Hazardous Fuels and Vegetation Reduction Projects(Fuels Protocol) ***w***as originally written in 2004 and it has been slightly modified and incorporated into the 2013 RPA in Appendix H. The Fuels Protocol was developed in response to the 2003 Healthy Forest Restoration Act (HFRA) in order to facilitate a streamlined Section 106 review of large broad scale hazardous fuels reduction projects. The Fuels Protocol covers two components: Prescribed Fire Treatments and Mechanical Treatments. The protocol allows for non-intensive and/or deferred inventory if project treatments and pre-field research meet certain conditions based on slope, vegetative density and past exposure to wildfire. Fuels Reduction activities that do not cause significant ground disturbance will be allowed to occur on archaeological sites in some cases utilizing standard resource protection measures (2013 RPA: Appendix H: Stipulation 5.0). In some cases, mechanical treatment can be approved for non-intensive inventory based on excessive (>30°) slope or impenetrable brush/vegetation based on the cultural resources at-risk by the specific treatment. Known at-risk sites, and areas with suspected cultural resources based on historic atlases, oral histories, and ethnographic research are considered at-risk and my not be subjected to non-intensive inventory. At-risk sites will vary some based on their archaeological constituents. Sites with historic artifacts including wood, glass, etc. which have no documented history of wildfire are at risk for fire treatments. Prehistoric sites with midden and faunal remains or exposed obsidian artifacts are also considered at-risk for burning if there is no documented fire history in the area. Many sites are not at-risk from underburning either because they are less vulnerable to fire (no wooden artifacts, midden, obsidian, etc.). Mechanical treatments are considered adverse effects to most cultural resources unless there are SPMs which can be reasonably implemented and they are approved by the Forest Heritage Program Manager (HPM).

Archaeological sites being hand treated will have the following restrictions placed on the project activities:

Chapter 14 All cut material must be carried off site

Chapter 15 All piles created during hand treatment must be piled out of the site boundaries

Chapter 16 No tracked equipment will be allowed within site boundaries.

All non-intensive inventory methods, standard protection measures and deferred inventory activities utilizing the Fuels Protocol must be approved by the Forest HPM.

Affected Environment

Prehistoric Land Use

The North Coast Range is the home of numerous tribal groups. The Clear Lake Basin, to the south of the project area, and its reliable resource base, made the area an important center of prehistoric activity. It is the largest and oldest natural body of water exclusively in the boundaries of the state of California. It is also thought that the Clear Lake basin could contain the oldest body of water in North America. Early research was focused on the possible Paleo-indian uses associated with the Borax Lake Site (CA-LAK-36). In 1938, fluted projectile points were discovered at this site and it was suggested by M.R Harrington that they are stylistically similar to archaic points found that were thought to have been made approximately 10,000 BP.

Research done in the 1970's along with the development of obsidian hydration dating techniques would later support Harrington's theory (Meighan and Haynes 1970; 1968). This research was primarily limited to pre-historic and proto-historic uses of the Borax Lake Site, located on the southeastern periphery of Clear Lake. The Clear Lake Basin has been the focus of archaeological investigations for more than seventy years. The Borax Lake Site exhibits the most reliable representation of the earliest occupation (10,000 – 12,000 B.P.) of the North Coast Ranges (Fredrickson 1974:497). Also this site has the longest continuous cultural chronology of any site in California (see Chartkoff, Frederickson, Moratto for regional cultural sequences).

Much research has occurred since the mid-1970s, and it has broadened to include a spectrum of archaeological manifestations including an examination of environmental and cultural changes within the Clear Lake Basin. Some of this research was integral to the development of a cultural-historical framework for the North Coast Ranges that has the most applicability to this study area. Fredrickson's Cultural Complex Chronology has been determined to most closely fit the prehistoric patterns present in the Pine Mountain project area.

Little research has been done in the coast range area directly north of the Clear Lake basin. The research that has been done along the northern part of the Middle Fork of the Eel River has revealed archaeological evidence such as wide stemmed projectile points that would support the possible use of the area extending into the Early Borax Lake Pattern (8,000-5,000 BP). The Eel River and its convergence with Salmon and Smokehouse creeks in what was Gravelly Valley (now inundated by Lake Pillsbury) is the closest location to the project area fitting for a large central village site. Archaeological evidence shows that a substantial village site did exist in the area yet research has been minimal due to the construction of Scott's dam in 1921.

The exact date of Euro-American contact in and around the project area is unknown, estimates have suggested that because contact seemed to be moving into the area from the south, initial contact with Euro-Americans in the Gravelly Valley area would have been earlier than that of the Yuki Proper of Round Valley. Miller places initial contact between Euro-Americans and the Ukomno'm Yuki in Round Valley in 1854. It is likely that earlier contacts were made with the southern groups of Yuki during the early days of the Spanish occupation of the area in the early 1820's. The trade of Native Americans during this time as laborers and slaves was legal and lasted through California's statehood in 1851. Kidnapping and enslavement of the indigenous population was not uncommon in Northern California during this time. Spanish, Russian and Yuki accounts hint at possible contact with the Yuki at earlier dates, yet these claims remain historically unsubstantiated. Historical records do not pinpoint or suggest a possible date for contact for the southern groups of Yuki.

The Pine Mountain APE lies within an area identified by ethnographers as the traditional boundaries between the Onkolukomno'm Yuki, the Huchno'm (both Yukian speakers) and the Northern Pomo. The Yuki language group is spoken by only four Native American groups; the Yuki proper, the Coast Yuki, the Huchno'm and the Wappo. Because tribal boundaries were traditionally flexible and differ between not only ethnographers but between tribal groups, identifying the exact physical location of these boundaries is likely impossible and unnecessary for understanding the prehistoric use of this area. Understanding that these tribal boundaries exist; however is helpful for understanding the use of the area and its role in commerce and obsidian trade in and out of the northern the Clear Lake Basin area, the salt trade between the Yuki and the Northeastern Pomo, and the trade of coastal goods from the coast inland.

These three tribal groups have similar subsistence patterns. Their geographic locations allowed them to be able to subsist on multiple food sources. Their proximity to the Eel River provided them access to the abundant anadromous fish populations. Their proximity to the prime hunting grounds of the higher elevations provided them access to the larger mammals that not only provided food but also furs and tools. Their location below the snow level and in larger lowland oak covered valleys allowed them access to food stuffs such as acorn.

Historic Land Use

Historic use of the Pine Mountain area began approximately in 1820-50's. The exact date is unknown yet historical data pertaining to the Clear Lake Basin places Spanish contact as early as 1821. Pine Mountain is located 17 miles northwest of the Clear Lake basin and is geographically separated from it. Steep ridges and canyons reaching in excess of 4,000 feet in elevation impede access into the area from the Clear Lake basin. Though this rugged geography may have slowed European/American movement into the Pine Mountain area, it did so for only a few years.

In 1834 General Vallejo was sent to the Sonoma area where he established the northern most Mexican post of Alta California, the Presidio of Sonoma. His younger brother Salvador Vallejo became Capitan of the militia at Sonoma in 1836. In 1839 Salvador Vallejo set up a ranch in the Big Valley area (now known as Kelseyville) on the west side of Clear Lake and brought herds of longhorn cattle into the Clear Lake basin. Salvador Vallejo used Native American men from villages around the lake as cattlemen and vaqueros. Among the Native American men Vallejo was utilizing to maintain his herds was a small collection of Spanish, Mexican, Californio and American men. These men are likely among the first of the non-Native American population to explore and establish residence in and around the Clear Lake area.

Ben and Andrew Kelsey, brothers of Sam Kelsey (Second Lieutenant of the Bear Flag Republic), Charles Stone and a Mr. Shirland purchased cattle from Vallejo and moved into the Clear Lake area in 1847. This occurs only months after the Bear Flag Republic flag is raised in Sonoma, and California becomes a territory of the United States in late 1846.

Andrew Kelsey and Charles Stone move into the location of Salvador Vallejo's ranch house in the Big Valley area. There they followed the precedent set in the area by Vallejo and continued to force the local Native Americans to work for them with little to no payment. The treatment of the Native Americans in the Clear Lake area by Kelsey and Stone was extremely harsh. Animosity for this treatment finally grew to a head when both Stone and Kelsey were killed in 1849. Once Kelsey and Stone were killed Salvador Vallejo sent men to gather up the cattle that roamed the area and return them to his ranch in Napa. Three of the men sent up from Napa to gather the cattle in the Clear Lake area after Kelsey and Stones murder were Calvin Griffith, J. Brome Smith and Benjamin Logan Moore.

These three men ventured into the Clearlake area in an attempt to gather the entirety of Kelsey's and Stone's cattle enterprise. It was soon realized that there were more cattle in the area than these men would be able to wrangle. Plans were made to gather the majority of cattle and return later to collect what remained for their own benefit. Few cattle were branded in in this time and place so identifying the cattle would be next to impossible. Upon returning it was realized that the remaining cattle had already been wrangled and driven to a ranch in the Ukiah area. Ben Moore and his collection of vaqueros followed the trail left by the movement of these cattle and in the cover of night collected of them what they could and quickly moved them to market.

Soon after Ben Moore became notorious in the Clear lake area. After killing a man in a sword duel while selling the remaining Kelsey Cattle, Ben Moore returned to the Clear Lake area and established a home in the Pine Mountain area near a creek that now bears his name. Attempting to evade any arrest for the killing, the seclusion that this area provided was ideal for hiding from any reparations desired for the murder. The establishment of his home in the area predates the homestead filed by William Montgomery in 1884, though reports state that Montgomery knew Ben Moore prior to establishing his land claim. It is at this area where Ben Moore marries an Indian woman from the Grindstone Rancheria and his son Dick Moore is born in 1857. FS site # 54-240, 54-410 and possibly 54-121 are possibly associated with the early Benjamin Moore settlement and the later homestead settlement of William Montgomery.

Ben Moore becomes a figure in the Clear Lake area after his time spent in the Pine Mountain area. He soon becomes a notorious cattle rustler moving stolen cattle back and forth across the coast range. His adventures have him moving stolen cattle between the Hopland/Ukiah Valleys and The Great Central Valley for the next few years, leaving a legacy of place names named after him.

The Homestead Era

The Preemption act of 1841 and the Homestead Act of 1862 opened up millions of acres of federal land in the west for settlement. Government Land Status maps show that homesteading in the Pine Mountain area did not start until 1881 and that William Montgomery filed on the Ben Moore parcel in 1884. Thirty-four homestead claims were filed on parcels of land in the Pine Mountain Project area between 1881 and 1907, totaling in an estimated 4,000 acres of the project area.

Grazing and timber harvesting are the first known historic uses of the area, beginning in the mid-1800s. The common practice was to choose smaller tracts that secured control of much larger ranges by patenting claims to prime grazing and timber areas at significant springs. Isolated from mainstream development, vast grazing lands were the most important agricultural resource, with mountain ranges used for summer grazing and valley/lowland areas used in winter. After the formation of the Stony Creek Forest Preserve on February 6, 1907, two types of range were designated, one for sheep and goats and the second for cattle and horses. Developing water sites was an important goal to insure proper use of the range.

National Forest Era

With the formation of the Forest Preserve in 1907, radical changes occurred for most users. However, the recreation program was not overly regulated with hunting and fishing a mainstay on the forest. By 1912 maps were being printed that outlined trails, discussed campsites, explained campfires and permits. The reserve was added to the National Forest System in March of 1907. On July 2, 1908 the boundaries of the Stony Creek National Forest were finalized and its name was changed to The California National Forest. By the 1920s, the California National Forest had instituted a trails program to open up large portions of the area. In July of 1932 President Herbert Hoover signed an executive order again renaming the forest the Mendocino National Forest (Docken et al. 1982:30-32). This was done in order to avoid any confusion between state and federal lands.

While grazing was one of the first uses of the area, the other important use since the 1870s has been logging. Numerous sawmills dotted the Mendocino National Forest (Griner 1998). Many of the early sawmills were portable and moved with the logging activity. Some of the early homestead claims were established in order to log the virgin conifer forest that dominated the area. Prather Mill, which was the only railroad logging/milling operation in Lake County, and Howard Mill, which operated from 1919 through the early 1950's, are located southeast of the project area and may have operated in the south eastern part of the project area. The early logging activities that took place directly within the project area stemmed from the York Cabin area. The Whitely Mill was located on the private property west of the York Cabin area (FS site # 54-658).

In the depths of the Great Depression President Roosevelt proposed as part of his New Deal program the Emergency Conservation Work Act. Proposed to congress on March 21st 1933 and approved on the 31st, this act would in turn create the Civilian Conservation Corps (CCC). The CCC was designed to pull unemployed, unmarried men from relief families, ages 18–25 and put them to work in the nations National Forests. The first CCC camp was built in 1933 and the program lasted until 1942 when the nation found itself needing to focus on its involvement in World War II.

The Civilian Conservation Corps played a major role in the history of the Mendocino National Forest. The young men enrolled in the program constructed many of the major roads, communication lines, Ranger Stations, Guard Stations and Fire Lookouts throughout the Mendocino National Forest. This supply of labor resulted in an excess of construction on National Forests. This left the National Forests with a surplus of structures that they could not afford to staff. Many of the structures built by the CCC soon became surplus in later years. They were subsequently destroyed or abandoned. The Pine Mountain Lookout (Table 2, FS site # 05-08-54-180) was constructed by the CCC in the mid 1930's. With the advancements in fire detection technology the Pine Mountain Lookout along with many other lookouts on the forest were abandoned and/or destroyed. The Pine Mountain Lookout has been determined eligible for listing on the National Register and has been placed in the National Lookout rental program.

Effects Analysis Methodology

The current project area has received intensive archaeological survey for forty-four previous projects between 1978 and 2015 (Forest Service archaeology files, Upper Lake Ranger District). The combined coverage of these surveys covers areas of potential ground disturbing effects (such as landings, water holes, logging systems and mastication) within the project area. There are twenty-eight archaeological sites within the project boundaries.

Geographic and Temporal Bounds

The project boundary was used as the baseline boundary to analyze the effect of the project to cultural resources. This project boundary was used due to the fact that it encompassed areas of potential effect, the location of historic properties within this boundary were used to consider direct, indirect and cumulative effects. The area of potential effect also includes the roads used by logging trucks and other mechanized equipment and the landings in which the equipment and logs will be staged. The timeframe for the analysis of both direct and indirect effects is the duration of the project activities, estimated between 5 to 7 years.

Analysis Methodology

The data sources for identifying the cultural resources in the project area were the fifty-one archaeological surveys (this number includes all levels and types of survey) that have been conducted in the project area. Forty-four of those surveys were conducted at the intensive level and meet the survey requirements cited under Stipulation 7.4 of the 2013 RPA. Intensive survey was conducted using pedestrian transects that were spaced no more than 30 meters apart. Identified potential log landing locations and skid trails were also included in these surveys. The remaining seven non-intensive surveys do not meet the survey requirements set forth in the 2013 RPA, although they meet criteria for less than intensive survey under the Fuels Protocol (2013 RPA: Appendix H).

Several types of data were compiled to provide the basis for understanding the nature and extent of cultural resources within the Project Area, and the potential effects of proposed hazardous fuels reduction and vegetative forest health treatments on these resources:

Chapter 17 Archival and literature sources have been reviewed. Data from Forest Service cultural resource records, maps and geographic information system (GIS) layers were compiled to provide a prehistoric and historic overview of the geographic region, identify major historical themes and events, and provide information on previous archaeological inventories, known site locations, and the likelihood of unidentified resources within the project area.

Chapter 18 All areas where ground disturbing activities are planned to take place, including areas that had not been previously intensively surveyed, were inventoried for this project. Data collection was focused on physical location of archaeological resources. The project area was intensively surveyed on forty-four occasions since 1978. The combined coverage of these surveys covers all treatment areas and areas of potential ground disturbing effects (such as landings, water holes and logging systems) within the Project Area.

Chapter 19 The archaeological surveys located twenty-eight sites, although not all of these sites are located in or near proposed treatment areas. Eight of the sites are historic, sixteen are prehistoric and four are multi-component sites (multi-component sites contain both historic and prehistoric artifacts and or features). All cultural resources identified within the Area of Potential Effects are considered archaeological properties, as defined in the Appendices of the 2013 RPA, for purposes of this undertaking, unless they have already been determined not eligible in consultation with the State Historic Preservation Office or through other agreed upon streamlined procedures defined in the 2013 RPA. Sites that have not been evaluated for National Register eligibility shall be treated as eligible, and would therefore be protected until such time as an eligibility determination is made.

Environmental Consequences

Cultural resource effects are defined as:

Chapter 20 Direct Effect is or could be caused by proposed hazardous fuels reduction and vegetative treatments or the consequences of such action, including physical damage resulting from tree felling and removal, use of heavy equipment (crushing and/or displacement)) and connected actions (construction of roads, landings, water holes, etc.) and prescribed burning (scorching and cracking caused by excessive heat)

Chapter 21 Indirect Effect to sensitive archaeological resources could occur, particularly where sites/artifacts lie in close proximity to proposed treatment areas and become vulnerable to connected environmental effects (e.g., increased erosion, accessibility/looting, etc.)

Chapter 22 Cumulative Effects to archaeological resources occur when long term Direct and Indirect effects linked to the proposed action and alternatives occur.

> Effects for cultural resources were split between ground disturbing activities and non-ground disturbing activities. Ground disturbing activities include: (1) commercial thinning, (2) mechanical piling and burning, and (3) mastication and any connected activities (e.g., maintenance and construction of roads, water holes, landings, etc.). The direct and indirect effects of using equipment for these actions are that cultural resources can be damaged if equipment is used within the boundaries of these sites. The burning of piles can also damage cultural resources if the piles are created and burned on sites (Solomon 2000 and 2002). These direct and indirect effects can and will be avoided using the standard resource protection measures identified in Appendix E of the 2013 RPA. Therefore the protection measures ensure that there will be no direct or indirect effects to cultural resources.

Non-ground disturbing activities can include hand thinning, piling, and underburning. Hand thinning and piling can affect cultural resources if the piles are placed within site boundaries. Pile burning has been shown to damage archaeological sites (Solomon 2000 and 2002) and underburning can destroy combustible artifacts and features on sites (see following paragraph). Sites with combustibles or other fire sensitive cultural remains within burn units will have fire lines placed around them or in particularly sensitive portions of the site so they are not burnt over. Sites without fire sensitive cultural materials will be allowed to have underburning traverse the site as long as the fire remains at low intensity.

The effect analysis follows the assumption that reductions in fuel loads have a positive effect for archaeological resources through a reduced risk of high intensity wildfire. High intensity wildfires can cause adverse impacts to archaeological resources through reduced vegetation and loose burned soils that can lead to erosion problems. Archaeological features made from combustible materials can burn, while features made from material such as rock, can crack and even explode due to the extreme heat that these wildfires are capable of producing. Artifacts at sites can also be affected by fire, obsidian artifacts can lose hydration rings and can even melt, bone and wood artifacts can burn glass and ceramic artifacts can explode or melt. Metal artifacts can melt or fall apart. Low intensity fires and controlled burning on archaeological sites that do not contain fire sensitive features or artifacts have been found in some cases to benefit and not adversely impact these resources (Solomon 2000 and 2002) as the threat of catastrophic wildfire is reduced after low intensity underburning.

Summary of Findings

There are no significant effects to cultural resources from project activities within any of the alternatives. There would be no effect to cultural resources if alternative 1 is chosen since there would be no action taken and no ground disturbing activities. Alternative 1 would have a negative cumulative effect due to an increase in the probability of a wildfire occurring within the project area. The probability of a wildfire burning within the current fuel loads is high and presents a threat of wildfire burning through archaeological sites and causing irreversible damage. Compared to the current fuel levels, this alternative would contribute towards the protection of archaeological sites. Under alternatives 2, 3, 4, and 5 there is the potential for a greater risk of direct and indirect effects, due to the possibility that cultural resources could potentially be damaged by project activities. These alternatives include use of ground based equipment that can cause direct and indirect effects if equipment is used within the boundaries of archaeological sites; however, this probability of damage will be eliminated by the use of standard resource protection measures (USDA 2013). The cumulative effects under alternatives 2, 3, 4 and 5, are a reduced likely-hood of the cultural resources being irreversibly damaged by the effect of wildfire. The threat from inadvertent effects can occur on surveyed ground as sometimes archaeological sites or parts of sites are missed during surveys.

All of the proposed alternatives would require the same level of protections pertaining to archaeological resources. Inventory and Standard Protection Measures (SPM) would be applied to every archaeological resource not yet evaluated or determined eligible for listing on the National Register of Historic Places for all proposed alternatives.

During the implementation of this project, all NRHP-eligible or unevaluated cultural resources (n=26) will be protected from ground disturbing activities using the SPMs in Appendix E of the 2013 RPA. Activities that could potentially cause ground disturbance for this project include mechanical thinning, piling and burning, mastication, underburning and any connected activities (e.g., construction of roads, landings, water holes, etc.).

Climate Change

Affected Environment

The Forest Service have recognized the important role climate change has on the nation's forest and grasslands. In the 2009 summary Strategic Framework for Responding to Climate Change, former US Forest Service Chief Abigail Kimbell and Hutch Brown describe:

> The nation's forests and grasslands contain vital components of biodiversity, an essential part of America's national heritage. They provide most of the water Americans use for drinking, agriculture, and industry. They furnish fiber for paper, lumber, and other wood products. They provide clean air, livestock feed, and recreation opportunities; and they support habitat for myriad plant and wildlife species. Healthy and productive forests and grasslands can also supply renewable energy and other offsets for fossil fuel emissions.
>
> Climate change threatens all of these services. Since the 1980s, Americans have seen such effects as changing water regimes, spreading bark beetle infestations, and increasing wildfire severity and area burned. Even if global greenhouse gas buildups were reversed today, global temperatures would continue to rise for the next hundred years, bringing regional warming, changes in precipitation, weather extremes, severe drought, earlier snowmelt, rising sea levels, changes in water supplies, and other effects. As it is, global greenhouse emissions are still rising, exacerbating all of these long-term effects. The capacity of many plant and animal species to migrate or adapt will likely be exceeded. Ecosystem processes, water availability, species assemblages, and the structure of plant and animal communities and their interactions will change. In many areas, it will no longer be possible to maintain vegetation within the historical range of variability. Land management approaches based on current or historical conditions will need to be adjusted.

In this analysis, climate trends will be discussed followed by its potential effects related to the proposed project.

Temperature and Precipitation Trends

The Northwestern California ecoregion, which includes the Mendocino National Forest, shows an increase in mean (0.32° F, 0.18° C) and minimum (0.85° F, 0.47° C) temperature and a decrease in maximum (-0.41° F, -0.23° C) temperature between historic (1900-1939) and modern (1970-2009) times (Rapacciuolo et al. 2014).

On the Mendocino National Forest, for two of the five weather stations with available temperature data, temperature increases were greatest in minimum mean (nighttime) temperature when compared to mean and maximum mean (daytime) temperatures. This finding is consistent across California (Cordero et al. 2011, LaDochy et al. 2007) and the globe (Vose et al. 2005). Significant increases in nighttime temperatures have also been observed at several stations on the Klamath, Shasta-Trinity, and Six Rivers National Forests.

Total annual precipitation is (statistically) steady over the period of record for four of the five stations, increasing marginally at Stony Gorge Reservoir, moderately at both Paskenta and Stonyford Ranger Stations, and significantly at East Park Reservoir weather station. There is very high interannual variability in all five precipitation records, such that the value predicted by the regression line in each figure is rarely representative of the actual annual mean. The increase in annual precipitation at the East Park Reservoir station is being driven by moderately significant increases in precipitation in all seasons except summer (June-July-August) over the period of record from 1927-2002. There were no other significant increases in precipitation by season from any station, and the distribution of precipitation across the year has remained similar through the record.

The 5-yr coefficient of variation of annual precipitation is increasing over time at all stations. An increasing coefficient of variation in annual precipitation demonstrates that year-to-year variability in precipitation has increased, while a steady coefficient of variation denotes that year-to-year variability remains relatively stable. Increases in interannual variability have important implications for ecosystem, water, and fire management.

While most of the weather stations do not receive substantial amounts of snow, all stations show declining trends in annual snowfall, three of which are statistically significant (Covelo, Paskenta, and Stony Gorge).

Environmental Consequences

Two types of climate change effects were considered for the Pine Mountain Project:

-The effect of the proposed project on climate change
-The effect of climate change on the proposed project and project area

Effect of the proposed project on climate change

Activities related to commercial harvest and fuels treatments would, without question, involve the release of greenhouse gases, including carbon dioxide, which are understood to contribute to global climate change (direct effects). However, project level emissions alone are not sufficient to cause climate change. Since greenhouse gases mix readily into the global pool of greenhouse gasses, it is not currently possible to ascertain the indirect effects of emissions from single or multiple sources (projects). Also, because the large majority of Forest Service projects are extremely small in the global atmospheric CO_2 context, it is not presently possible to conduct quantitative analysis of actual climate change effects based on individual or multiple projects. Additionally, as greenhouse gases are integrated across the global atmosphere, it is not possible to determine the cumulative impact on global climate from emissions associated with any number of particular projects. Nor is it expected that such disclosure would provide a practical or meaningful effects analysis for project decisions.

There are also tradeoffs between emissions released by the project activity and carbon sequestered as a result of improved ecosystem function. The goal of the project is habitat enhancement and protection through restoration of ecological processes which would include the reduction of fuels and thinning of overstocked stands. The project is also expected to improve the capability of the stands to withstand climate change stresses by reducing overstocked stands making them more resilient and less susceptible to insect and disease and wildfire (see “Vegetation” and “Fuels” sections).

Predicted climate changes include air temperature increases, changes in the timing, location, and quantity of precipitation; and increased frequency of extreme weather events such as heat waves and droughts. Analysis of the impacts of greenhouse gasses and carbon dioxide emissions or sinks at the project level is insufficient to provide meaningful information to translate into climate change. The Forest Service is heading toward approaches that lead to reduced greenhouse gas emissions or increased sinks of these gases. Activities that result in reduced fuel combustion would release less greenhouse gases. The removal of merchantable wood and biomass would result in greater carbon sequestration.

Effects of Climate Change on the Mendocino National Forest and project area

This section is summarized from Butz's el al (2015)- A summary of current trends and probable future trends in climate and climate-driven processes for the Mendocino National Forest.

Hydrology

Although climate models diverge with respect to future trends in precipitation over NW California, there is widespread agreement that the trend toward lower SWE and earlier snowmelt will continue (Leung and Wigmosta, 1999; McCabe and Wolock, 1999; Miller et al. 2003; Snyder et al. 2004; Barnett et al. 2005; Zhu et al. 2005; Vicuna et al. 2007; Van Kirk and Naman 2008). In basins without winter snow accumulation, such as the Eel River basin, base flow is relatively insensitive to increasing temperature (Miller et al. 2003). If precipitation does increase, streamflow volumes during high flow events could greatly increase. Because of the relatively low mountain elevations in the project area, flow in most streams are most sensitive to changes in precipitation rather than changes in temperature, as snowpack input to flow is relatively low.

While hydrological changes in snow-dominated areas like the Sierra Nevada will mainly depend on shifts in precipitation patterns, vegetation shifts may play a more central role in changes to hydrology in lower elevation, shrub-dominated systems (Tague et al. 2009). Hydrology in semi-arid Mediterranean type ecosystems (such as the Pine Mountain project area) is largely dependent on climate-vegetation-soil-water interactions, which can vary strongly with temperature and CO_2 levels (Tague et al. 2009). Increased temperatures alone will likely reduce net primary productivity (NPP) in Mediterranean ecosystems (Penuelas et al. 2007). This reduction in NPP would lead to reduced water use, potentially leading to a moderate increase in summer streamflow (Tague et al. 2009). However, when modeled with the increase in CO_2 levels that are driving climate change, impacts of CO_2 will lead to higher biomass and NPP in chaparral ecosystems, and thus higher water consumption, probably far outweighing the losses due to temperature (Tague et al. 2009). Frequency of low streamflow years is projected to be considerably higher with greater levels of atmospheric CO_2, and NPP is projected to more variable from year to year (Tague et al. 2009). Additionally, rainfall is predicted to occur in higher concentrations in fewer events leading to higher variability and unreliability in meteoric, stream and ground water in a region already subject to the most variable precipitation regime in North America (Dettinger et al. 2011). Warming temperatures are also expected to extend the period of summer drought, and decrease flows in the dry months (Reba et al. 2011).

Increased water demand, extended drought periods, and a high precipitation variability area likely to increase ecosystem vulnerability in a changing climate.

Fire

Eighty years of effective fire suppression in the American West have led to fuel-rich conditions that are conducive to intense forest fires that remove significant amounts of biomass (McKelvey et al. 1996, Arno and Fiedler 2005, Miller et al. 2009). Most future climate modeling predicts climatic conditions that will likely exacerbate these conditions. Flannigan et. al. (2000) predicted that mean fire severity in California (measured by difficulty of control) would increase by about 10% averaged across the state.

Increased frequencies and/or intensities of fire in coniferous forest will almost certainly drive changes in tree species compositions (Lenihan et al. 2003), and will likely reduce the size and extent of late-successional refugia (USFS and BLM 1994, McKenzie et al. 2004).

Vegetation growth models that incorporate rising atmospheric CO2 show an expansion of woody vegetation on many western landscapes (Lenihan et al. 2003, 2008, Hayhoe et al. 2004), which could feedback into increased fuel biomass and connectivity and more intense (and thus more severe) fires. Fire frequency and severity (or size) are usually assumed to be inversely related (Pickett and White 1985), and a number of researchers have demonstrated this relationship for California forests (e.g. Swetnam 1993, Miller and Urban 1999). However, if fuels grow more rapidly *and* dry more rapidly – as is predicted under many future climate scenarios – then both severity and frequency may increase. In this scenario, profound vegetation type conversion is all but inevitable.

Vegetation

In the drier Interior Northern California Coast Range, there is a projected decline in shrubland and oak woodlands and an increase in grassland due to higher fire frequencies; hardwood-dominated forests also to increase in area while those suitable for conifer-dominated forests are projected to contract.

Loarie et al. (2008) projected that 2/3 of California's native flora will experience >80% reduction in range size by 2100. Endemic plant species that specialize in uncommon or sparsely distributed habitat (e.g. serpentine soils, montane meadows) will have difficulty responding to changing climatic conditions by migrating (Conlisk et al. 2013). Such narrowly distributed species are also at high risk due to disturbances like fires or floods that may extirpate entire populations. Conversely, areas resistant to change, such as north facing slopes or areas with deep, well-watered soils, may provide potential refugia (Olson et al. 2012, van Mantgem and Sarr 2015).

Wildlife

Significant changes in California's terrestrial fauna and flora are projected over the next century due to climate change effects on temperature, precipitation, and resulting habitat distributions. Changing disturbance regimes associated with climate change will also continue to impact wildlife species in complex ways in the future. Species that require older, denser, and more structurally complex forest conditions, like Pacific Fisher and the Northern Spotted Owl, will likely be negatively impacted by changes in fire regimes associated with climate change (Scheller et al. 2011). Population growth in Northern Spotted Owls is positively associated with wet, cool summer conditions, likely an effect of prey availability, but climate models predict warmer, drier summers which will likely negatively impact spotted owl populations (Glenn et al. 2010).

As the loss of synchrony between reproductive or migratory phenology and resource availability becomes more pronounced, for species like bats that have specialized diets and carefully balanced energy budgets (e.g. Pallid and Townsend's big-eared bats on the Mendocino), a shift in the timing of invertebrate prey availability could result in reduced survival or fecundity (Halofsky et al. 2011).

O'Neal (2002) suggested that by 2090, 25 to 41% of currently suitable California streams may be too warm to support trout. Sensitive benthic invertebrate populations may also be reduced by increases in large and severe wildfires that are likely to be associated with climate warming (Oliver et al. 2012). Larger effects will likely be observed in small, first-order streams (Oliver et al. 2012).

Recreation

The recreation analysis for the Pine Mountain Project is intended to describe the recreation resource in the project area and analyze the impact of the project's alternatives on those resources. For a full discussion of recreation issues in the Pine Mountain Project, see the Pine Mountain Recreation Specialist Report (USDA 2017g).

Affected Environment

The recreation environment potentially affected by the Pine Mountain Project consists of 2.78 miles of non-motorized trails, 1.4 miles of motorized trails, and dispersed recreation use (such as camping), which the LRMP emphasizes along travel corridors in the Forest interior. The project also contains, on its western boundary, portions of the motorized trail network known as the California Back Country Discovery Trail. The Discovery Trail is part of a vision of an off-highway motorized route from the Mexican to the Oregon border. Part of the Mendocino National Forest section of the trail runs through the project area; the sections in the project area are open to street-legal vehicles only. The two non-motorized trails in the area are the Packsaddle Trail (2.0 miles), and the Benmore Trail (3.2 miles). The motorized trails runs along the southeastern section of the project area. There are no developed campgrounds in the project area, but does contain a Lookout rental (Pine Mountain Lookout, open between May 1 through October 31 annually). There are no inventoried roadless areas, wilderness areas, or wild and scenic rivers within two miles of the project area.

The inventoried recreation opportunity spectrum class for the project area is roaded natural. As the LRMP dictates that the project area's management areas be managed consistently with their recreation opportunity spectrum class, recreation opportunities in the project area must remain consistent with the description of the roaded natural opportunity class as laid out in the Recreation Opportunity Spectrum Users Guide (USDA Forest Service 1982).

Environmental Consequences

Direct and Indirect Effects of Alternative 1 – No Action

The no action alternative is not expected to result in any changes to recreation opportunities. As Alternative 1 would have no direct or indirect effect on recreation resources, it would have no cumulative effects.

Direct and Indirect Effects Common to Alternatives 2 through 5

For the purposes of analyzing impacts to the recreation resource for the Pine Mountain Project, Alternatives 2 through 5 can be considered together. Alternative 3 differs from the others by no proposing any new temporary roads. Temporary road construction, however, is not a factor for the recreation resource. Thus, the analysis that follows is an examination of the impact of the action alternatives on various aspects of the recreation resource.

None of the activities proposed in any of the action alternatives would affect the status of the project area's recreation opportunity spectrum class. The harvest and fuelbreak actions proposed would not alter the experience, setting, remoteness, or other characteristics of the roaded natural recreation opportunity spectrum class that the LRMP requires be maintained.

The action alternatives may have short-term direct effects on the trail resources in the project area. In alternatives 2 through 5, harvest units and landings may be located near the Packsaddle Trail and OHV Trails 38 and 40. Landings and harvest activities for ground-based methods located near trails would cause temporary, short-term disruption to recreation users in the area. On the Packsaddle trail, a ground-based harvest landing is proposed at the site of an old landing that recreationists often use as parking and access for the trail. During project logging operations, these trails may be temporarily closed. Project activities are not expected to have any long-term impact on trail users, however, when mitigated by the design criteria discussed above.

The action alternatives may also have a short-term direct effect on the California Discovery Trail in the project area. Fuel corridors, temporary roads, landings, and harvest units are planned along the Discovery Trail route, and may cause short-term disruption to users of the trail during implementation. Mitigation measures discussed above would address these disruptions.

Alternatives 2 through 5 may also have a short-term direct effect on dispersed recreation activities in the planning area. Typical dispersed recreation activities for the area include camping, gathering of forest products such as mushrooms and firewood, and hunting. Proposed harvest activities along the planning area may temporarily disrupt these dispersed recreation uses during harvest operations.

Additionally, the alternatives would have a short-term impact on access to recreation activities. During active logging, roads would be temporarily closed. During log hauling, main arterial roads would remain open, and there would be some temporary closures on lesser standard roads. Access to dispersed and trail-based recreation resources would therefore be negatively impacted during active logging, and potentially impacted during log hauling operations.

Cumulative Effects to Recreation

Past management activities near the recreation resources in the planning area are limited to various controlled burn actions, including broadcast burns and burning of piled material. These past activities would not contribute to any impact of the Pine Mountain project. There are no known present management activities in the area that would potentially impact the area’s future recreation resources. There are no foreseeable cumulative effects from the project to recreation since the availability of the sites will remain the same after the project is completed.

Economic Analysis

This economic analysis evaluates proposed activity costs and benefits and describes project economic efficiency. Product value, removal and fuel treatment costs were developed for a possible timber sale and economic effects were evaluated for all project (timber sale and non-sale related) activities for each alternative.

Economic efficiency is the determination of the cost of planning and implementing forest management treatments and the benefits or revenues those treatments generate. Forest Service Manuals (2430-2432, 2008) and Handbook (2409.18 Chapters 10-30, 1990) require financial and economic efficiency information be available to the decision maker prior to substantial investment of capital and resources in timber sales. Proposed commercial thinning would achieve forest management objectives; therefore, the sale of timber is necessary to achieve those objectives. Revenue produced from a timber sale is considered an offset to the cost of accomplishing proposed actions.

Affected Environment

Scope of Analysis and Analysis Methods

Costs and expected stumpage values associated with the Pine Mountain project were estimated based on values from recent projects consisting of the service work entailed and with the most recent bids from sales on the Mendocino NF, along with considerations that would increase or decrease expected timber value bids on the project (for example: volume/acre, roadwork, haul distance, LOPs, etc.).

This analysis will assess potential impacts from proposed activities. Financial feasibility measuring the discrepancies between project costs and revenues over the life of the project was analyzed using the Forest Service Quicksilver program. Appraisals generated in the Region 5 TEA appraisal program will be used to facilitate an advertised bid rate for the project using the most up to date wood market prices.

The geographic scope of the economic and social analysis will mainly focus on Mendocino and Lake Counties, but it should be mentioned that with the lack of mill processing facilities and competition within those counties, that other, Regional facilities may be interested in the project and acquire remunerations relative to their workforce within those counties where mills reside.
Finally, the temporal scope of the analysis is around 13 years, the duration of the proposed activities (2018-2031).

A. **Project Feasibility**

Project feasibility relies on a residual value (stumpage = revenues - costs) feasibility analysis that uses local delivered log prices and stump to mill costs to determine if a project is feasible – will it sell, given current market conditions. For the DEIS, the most recent bids received on the Mendocino National Forest were used to estimate the predicted bid (expected high bid resulting from the timber sale advertisement) for the project. A comparison to base rates (revenues considered essential to cover regeneration plus minimum return to the federal treasury) was not analyzed as the analysis of the expected advertised bid is a baseline to help make an inference on the feasibility of the project from a monetary perspective. The high proportion of Douglas-fir expected to be removed relative to other species in the project makes it difficult to discern if the closest mill in Ukiah, CA would be interested in the project. Some mills predominately process some species and not others and Mendocino Redwood mainly processes redwood species, but is capable of processing Douglas-fir also. Being that the expected bid rate currently exceeds base rates, Pine Mountain LSR project may be considered a feasible project.

The infeasibility of a project indicates an increased risk that the project may not attract bids and may not be implemented (36 CFR 223.61 and FSM 2430.2). If the feasibility analysis indicates that the project is not feasible (predicted high bid is less than the base rates), the project may be modified. For this project analysis, most of the variables associated with an appraisal were considered, such as hauling and yarding costs (they are embedded in potential bid rate). Road maintenance costs and slashing costs were included.

B. Financial Efficiency

Financial efficiency provides information relevant to the future financial position of the program if the project is implemented. Financial efficiency considers anticipated costs and revenues that are part of Forest Service monetary transactions. Present net value (PNV) is used as an indicator of financial efficiency and is one tool used in conjunction with many other factors in the decision-making process. The PNV combines benefits and costs that occur at different times and discounts them into an amount that is equivalent to all economic activity in a single year. A positive PNV indicates that the alternative is financially efficient. Financial efficiency analysis is not intended to be a comprehensive analysis that incorporates monetary expressions of all known market and non-market benefits and costs. Many of the values associated with natural resource management are best handled apart from, but in conjunction with, a more limited financial efficiency framework. These non-market, ecological benefits are not in these calculations and are discussed throughout the EIS.

Economic Impact (Jobs and Labor Income)

Economic impacts evaluate potential direct, indirect, and cumulative effects on the economy. Generally, these impacts are measured by estimating the direct employment (full- and part-time jobs) and labor income generated by the 1) processing of the timber volume from the project, and 2) service work engaging in restoration activities planned for the project. Direct employment and resulting income benefit employees and their families facilitating a direct effect on the local economy.

For Pine Mountain, Mendocino Redwood Company in Ukiah (Mendocino County) is the closest mill capable of processing wood harvested from the project area. Analyzing the effects on labor and income from the estimated 5.775 MMBF anticipated from Pine Mtn project being hauled to Mendocino Redwood Co. would be difficult though as Mendocino Redwood prefers to process redwood species and does not have a history of bidding on sales within the Mendocino National Forest. Future discussion will take place as to where to appraise the destination of the wood harvested from Pine Mtn. Generally, Trinity River has a history of bidding and being awarded projects on the Mendocino National Forest that mostly consist of a Douglas-fir composition. Therefore, it would be reasonable to assume that most of the volume harvest during the project will be hauled to either Weaverville, CA or Oroville, CA. Pine species would likely be hauled to Anderson, CA. With that, this analysis will not provide an in-depth examination into jobs and labor income generated for wood processing. Obviously, if Mendocino Redwood bids on and is awarded Pine Mtn., the volume would increase their existing inventory of material and increase the job security of their employees. It is also positive that the wood has the ability to provide economic remunerations to other communities within the northern California region.

The Mendocino National Forest Land and Resource Management Plan discusses the implications of the Northwest Forest Plan and the inability of the Forest's timber program to play an economic role in any of the 6 counties that fall within the Mendocino National Forests administrative boundary. Mills that existed on the perimeter of the Forest in the communities of Covelo and Paskenta shut down in the 90's and have facilitated difficulty for the Mendocino National Forest to develop economically feasible forest management projects.

Service items such as post mechanical harvest that requires additional slashwork or small diameter thinning, piling, masticating, etc., have the ability to promote economic incentives to local communities as service contracts may be awarded to contractors capable of performing to specification the items of work. Sometimes contracts are awarded to contractors who are not local, but still utilize local businesses consisting of food, gas, lodging, etc.

Other benefits for the community are generally minimal, but fallout types of opportunities exist for local communities within close proximity of these project areas. Firewood collection opportunities increase for local folks who depend on wood as source for home heating.

Environmental Consequences

A. Project Feasibility

The estimation of project feasibility was based on the most recent bids on the Mendocino National Forest and the fact that wood prices have been gradually rising since the award of those projects back in 2013. One caveat to those projects was that roadwork was completed by the Forest Service and there were minimal road re-construction efforts needed for those past projects, but maintenance items were included within those bids. With that, Pine Mountain road package may put some additional roadwork on the onus of the contractor to bring roads up to specification before hauling and then continuing with road maintenance as hauling commences. Another variable of the analysis, was the amount of road maintenance itemized within each category of road level. I averaged what the estimated road maintenance costs/mile would be for roads in the project area consisting of different level of maintenance. Logging systems, timber species and quality, volume removed per acre, lumber market trends, costs for sale preparation, administration, slash treatment, road building and obliteration (alternative 2) are all taken into account for the estimated bids per alternative. Many dynamics may change between now and when the commercial material is actually appraised. It should be mentioned that the project has not yet been cruised and it's possible that the volume may be 10-20% more or less of the estimates used for volume under this analysis.

Base rates for Douglas-fir within the Region are \$3/CCF and \$6/MBF respectively. If road re-construction costs are included in the road package and appraisal, one would expect the bid rates to decrease and be closer to base rates. Base rate revenues are essential to cover regeneration plus minimum return to the federal treasury. The estimated high bid for each alternative is as follows: **Alternative 2 - \$67.50/MBF; Alternative 3 - \$66.05/MBF; Alternative 4 - \$61.42/MBF; Alternative 5 - \$63.44/MBF.** The Lakeview project was first appraised to Mendocino Redwood and the original offer went no bid. The second offer was at base rates and Mendocino Redwood bid on the project but was not awarded. In 2013, Hardin Sale on the Grindstone District sold for approximately \$66/MBF, but Douglar-fir was bid at \$88/MBF on that respective project. With prices gradually rising since that time, along with the majority of Pine Mtn project being Douglas-fir, make the estimated bids reasonable. Market volatility the last several years still make it difficult to make analysis such as these conclusive.

Revenue estimates from the feasibility analysis are used in the financial efficiency analysis discussed below.

B. Financial Efficiency

The financial efficiency analysis is specific to the timber harvest, fuels reduction, and restoration activities associated with the alternatives (as directed in Forest Service Manual 2400-Timber

Management and the Forest Service Handbook 2409.18). Costs for sale preparation, sale administration, slash-work, and burning are included. If exact costs were not known, the maximum of the cost range was used to produce mostly conservative results. Actual amounts per acre estimate on fuels work consisting of non-commercial cutting and re-arranging were hard to predict due to the fact that some of the intensity levels of the follow-up fuels work within the commercial units is unknown. Some of that work may require a light lop and scatter and others may require more intensive piling and yarding of unmerchantable size classes; wide range level of work from $250/acre to $1500/acre. Also, stewardship contracts sometimes offer a better value when goods are exchanged for services within these integrated types of project areas. There may also be opportunities for utilization of biomass and other small by-product markets, but the outlook is currently poor for that segment of the forest products market. Additional revenue and an increased PNV would occur if those markets engage with this project. The PNV was calculated using Quicksilver, an economic analysis program based on long-term, on-the-ground resource management projects. A 4% real discount rate was used over 13 year project lifespan (2018-2031).

This analysis is not intended to be a comprehensive cost-benefit or PNV analysis that incorporates a monetary expression of all known market benefits and costs that is generally used when economic efficiency is the sole or primary criterion upon which a decision is made. Many qualitative outcomes from the Pine Mountain project are hard to measure and are not included since they have no monetary value. Benefits from these projects such as reduced fire suppression costs with potential wildfire within that area post-treatment and habitat value that is being improved and maintained are two good examples of how all benefits of these projects are hard to put a price on.

Table 1 summarizes the project feasibility and financial efficiency, predicted high bid (estimated stumpage value plus expected overbid), total revenue, and PNV for each alternative. Long-term recreation levels are not expected to be impacted with an exception of a brief time of activity within the Pine Mountain lookout cabin vicinity. It may be unavailable for the dates of operating or the operations may be limited within certain dates to compensate for recreation activities at the cabin. The economic implications on this were not considered as it would be insignificant to the values that had thus far been generated for the project.

Table 55 indicates all action alternatives are financially inefficient when all stewardship/service items and burning activities are considered. The No Action Alternative has no costs nor revenue associated with it and in this case, has the highest PNV ($0). All action alternatives consist of negative PNV's greater than $1 million. There is a tremendous amount of fuels reduction work being considered for the project and it is estimated that it could take up to 10 years to complete.

A reduction of financial PNV in any alternative as compared to the most efficient solution is a component of the economic trade-off, of achieving that alternative. The No Action Alternative would not harvest nor take other restoration types of actions and therefore, incurs no costs. As indicated earlier, many of the values associated with the Pine Mountain project such as enhancing wildlife habitat, reducing threats of large uncharacteristic wildfires, and restoring historic ranges of disturbance regimes to ecosystems are considered non-market benefits. These benefits should take high consideration along with the financial efficiency information presented here. These non-market values are discussed throughout the various resource sections found within this document.

Table 55. Project Feasibility and Financial Efficiency Summary for Pine Mountain LSR (2015 dollars)

Category	Measure	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Timber Harvest Information	Approximate Acres Harvested	0	1700	1700	950	1640
	Volume Harvested (MBF)	0	5,775	5,775	3,325	5,565
	Predicted High Bid ($/MBF)	N/A	$67.50	$66.05	$61.42	$63.44
	Total Expected Revenue (Thousands of $)	$0	$338,073.87	$339,619.51	$179,097.96	$313,337.48
Timber Harvest and All Other Planned Activities	PNV ($)	$0	-$1,476,785.21	-$1,478,526.52	-$1,676,794.46	-$1,407,622.48

Financial efficiency is one tool the decision maker uses to make the decision. Again, many of the outcomes are intangible such as, increases in the fires suppression options available to the line officer following treatments, effects on wildlife, potential social impacts on communities, and restoration of watersheds and vegetation. The line officer needs to take all of these factors into account when making a decision on projects like Pine Mountain.

Activity Costs

Table 56displays the design criteria activities, their estimated costs, and the potential available revenue need to pay for those activities. The available revenues estimates represent the indicated advertised rate which the starting point of a sale for bid. Look at the adjustment of 25% to provide a cushion to the available revenue estimate to account for factors such as an overestimate of cruise volume.

Table 56. Activity Expenditures by Alternative. Number of years activities take place varies.

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Available Revenues					
Estimated Advertised Rate	$0	$338,073.87	$339,619.51	$179,097.96	$313,047.38

Neg. Adjustment for Potential Underrun (25%)	$0	$84,518.25	$84,904.87	$44,774.49	$78,261.85
75% Stumpage Available for Stewardship	$0	$253,555.32	$254,714.64	$134,323.47	$234,785.53
Activities not included in the Appraisal					
Field Prepwork; Layout/Mark/Cruise	$0	$200,450.25	$200,450.25	$125,446.46	$193,161.15
Sale administration (5 yrs)	$0	$265,811.94	$265,811.94	$221,509.95	$249,308.40
Road Maintenance (6yrs)	$0	$57,714.42	$57,714.42	$39,174.03	$53,907.66
Temporary Road Construction and Decommissioning (.35 miles)	$0	$3,697.37	$0	$0	$0
Cutting and Rearranging of non-commercial material (lop/scatter, pile, skid, deck, masticate, etc.)	$0	$1,162,373.94	$1,162,373.94	$1,369,759.17	$1,177,273.70
Burning of chaparral (10 yrs)	$0	$56,728.72	$56,728.72	$56,728.72	$56,728.72
Underburning of Forested Stands (10 yrs)	$0	$69,720.79	$69,720.79	$42,090.39	$36,868.18
Monitoring and treatment of Noxious Weeds at Landings (3yrs)	$0	$2,059.02	$2,059.02	$1,183.00	$2,009.67

The estimated revenue, based on the stumpage rate after a reduction for Treasury obligations, ranges from $112,528.09 to $253,555.32. If sale goes no-bid and is re-offered, it would be assumed that stumpage available for stewardship would be less for an award on a re-offer sale. As one can see, the cutting and re-arrangement of small diameter fuels is where a high proportion of the project costs come from. The values mentioned would be what is available to pay for service-oriented work for the project if the Forest decides to offer a stewardship contract for the project.

Differences in the costs of the majority of the items revolve around the fact that Alternative 4 will contain nearly half of the commercial acres within the project than Alternatives 2, 3, and 5. With that, those acres are still planned for non-commercial thinning, so the costs of those projects become offset by less revenue expected because of half the acres being offered with a commercial component. Regardless, unless revenues are higher than the estimated advertised rates, funding in addition to the expected revenue from timber value will be needed to achieve the non-commercial, restoration-types of activities.

The sale of timber in this project is an incidental outcome of the commercial and non-commercial thinning to meet a variety of objectives such as hazardous fuels reduction, habitat improvement, forest health and increased resilience to natural disturbance.

Information for this document was generated from the Mendocino National Forest Land and Resource Management Plan, bid and appraisal information from the Hardin Timber Sale and Lakeview Stewardship Project, and from the use of the Forest Service Quicksilver Economics Analysis program.

Summary

For more economic information regarding timber harvests and their impacts on jobs and labor within northern California, refer to the latest version of *California's Forest Products Industry and Timber Harvest* annual reports, authored by the Pacific Northwest Research Station.

The alternatives appear to be financially feasible, given that estimated high bids are obtained and greater than base rates. All alternatives also have negative present net values when using predicted high bid multiplied by expected volumes. Alternative 2 has the highest PNV. To implement any alternative, additional funding will likely be needed depending on the sale revenue.

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Short-term uses, and their effects, are those that occur within the first few years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project has been implemented. Under the Multiple-Use Sustained-Yield Act and the National Forest Management Act, all renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grown again if the long-term productivity of the land is maintained. This long-term productivity is maintained through the application of the project design features described in Chapter 2, in particular those applying to the soil and water resources.

Alternatives 2through 5 would provide timber products, in decreasing yields, to benefit consumers in the short term. Alternatives 2 through 5 would cause a very short-term increase in fuel hazard in the period between harvesting and activity fuel treatment. This would be accompanied by a long-term increase in stand vigor, a reduction in fuel hazard, and a corresponding decrease in the risk of stand-replacing fire occurring within the harvest units.

There would also be a 3- to 5-year increase in fuel hazard from post-harvest treatments and a corresponding increase in stand vigor as discussed in the “Fuels” section of this chapter.

Under Alternative 2, the use of a new 0.25 mile temporary road would provide improved efficiencies in cost-effectively providing timber products from those units where access needs warrant their use. Subsequent road decommissioning identified temporary roads would produce beneficial long-term effects to the beneficial uses of water from reduced sediment delivery into stream channels with either of these alternatives.

Under Alternatives 2, 3, and 4 within northern spotted owl territories, all current habitat function would be maintained in the treated areas, although a negligible amount of nesting and roosting (about 60 acres) would be temporarily affected. In the long term, this project is expected to have beneficial effects through restoration and protection of higher quality habitats. The project is consistent with the 2011 Northern Spotted Owl Recovery Plan and the 2012 Critical Habitat Rule. Limited operating periods would be imposed to prevent noise and smoke disturbance during the peak breeding season. These effects are discussed in the “Threatened and Endangered Wildlife Species” section of this chapter.

Unavoidable Adverse Effects

Implementation of any action alternative could cause some adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Some adverse effects are short term and necessary to achieve long-term beneficial effects. Many adverse effects can be reduced, mitigated, or avoided by limiting the extent or duration of effects. The interdisciplinary procedure used to identify specific harvest units and roads was designed to eliminate or lessen the significant adverse consequences to resource protection standards of the Mendocino National Forest LRMP. The application of project design features was intended to further limit the extent, severity, and duration of potential effects. Such measures are discussed throughout this chapter. Regardless of the use of these measures, some adverse effects would occur.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

Irreversible commitments are decisions affecting non-renewable resources such as soils, wetlands, cultural resources, or the extinction of a species. Such commitments are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or because the resource has been destroyed or removed. No irreversible commitments of resources were identified.

Irretrievable commitments apply to the loss of production, harvest or use of natural resources. The production lost is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume production.

Energy Requirements, Conservation Potential, and Depletable Resource Requirements

Consumption of fossil fuels would occur with the action alternatives during logging and hauling timber and during the decommissioning of temporary roads. However, no unusual energy requirements are associated with this proposal nor is it the type of proposal that provides an opportunity to conserve energy at a large scale.

Wood is a renewable resource. With the proper application of the project design features and best management practices intended for the activities to comply with LRMP standards and guidelines, soil productivity would be conserved as discussed in the *Soil* section.

Prime Farmland, Rangeland and Forest Land

The planning area does not contain any prime farmland or rangeland. Prime forest land does not apply to lands within the National Forest System.

Possible Conflicts with other Land Use Plans

The proposed action and action alternatives would take place entirely on National Forest System land. Only small amounts of private land lie adjacent to the planning area. These alternatives are not in conflict with planning objectives for Lake County or local tribes.

Environmental Justice

Executive Order 12898 relating to environmental justice requires an assessment of whether minorities or low-income populations would be disproportionately affected by proposed actions. An environmental justice issue arises when conduct or action may involve a disproportionately high and adverse environmental or human health effect on identifiable low-income or minority populations.

Local Indian tribes and the general public were notified of this project and provided an opportunity to provide comments by way of the public participation process described in Chapter 1 of this document.

Anticipated effects on minorities or low-income people are variable with the no action alternative. Not creating any new work opportunities could disproportionately affect low-income populations in the Northern Province counties. No change in subsistence consumption is anticipated. The risks to human health and safety are not expected to change from the current condition under the no action alternative.

The action alternatives could provide new short-term work opportunities that could benefit low-income populations in the Northern Province counties. Also, the action alternatives would avoid adverse impacts to public safety through expert project design consistent with all laws and regulations. Either action alternative would include standard public health and safety clauses in all contracts. Actions such as dust abatement, signing of roads identifying the area as an active timber sale, safely securing truckloads, and maintaining the haul route, are standard precautionary measures. Subsistence consumption is not expected to change from the current pattern.

In conclusion, there are no environmental justice issues affecting human health or the environment that would have an adverse effect on minority or low-income populations through the implementation of the action alternatives.

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders."

Under the Endangered Species Act of 1973, as amended, Section 7(a)(2), the Forest Service shall, in consultation with and with the assistance of the Secretary of the Interior (U.S. Fish and Wildlife Service), insure that any action is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The National Marine Fisheries Services have been consulted in regards to endangered or threatened fish species that may be affected by the proposed project. The Forest Service completed plant and wildlife biological assessments and found that the action alternatives may affect but would not likely adversely affect the northern spotted owl and northern spotted owl critical habitat. There are no other listed species associated with this project. Formal consultation with the U.S. Fish and Wildlife Service will be initiated once the final EIS is prepared. Field visits and electronic communications with USFWS have been ongoing throughout the development of this project.

Under the National Historic Preservation Act, consultation will be initiated with the State Historic Preservation Office with a copy of this DEIS along with the Cultural Resource Inventory Report. Standard resource protection measures have been applied to those sites in and near the Area of Potential Effect. The alternatives considered would not affect sites listed in, or eligible for listing in, the National Register of Historic Places.

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Federal, State, and Local Agencies and Tribes

The Forest Service consulted the following Federal, State, and local agencies and tribes during the development of this draft environmental impact statement:

Environmental Protection Agency

USDI Fish and Wildlife Service

National Marine and Fisheries Service

California Regional Water Quality Control Board, North Coast Region

Lake County Air Quality Management District

Distribution of the Draft Environmental Impact Statement

This DEIS will be distributed to the listed individuals who specifically requested a copy of the document. In addition, copies have been sent to the listed Federal agencies, State and local governments, and organizations representing a wide range of views.

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Appendix A – Project Specifications

List of Treatments

A1 Treatment Prescription 1 - Ecological Fuel Reduction Treatment Plantations Areas

Treatment 1 is a thinning treatment prescription that is a fuel reduction treatment focused on treating previously established early succession plantation stands. The treatment will be applied to trees that depending on market conditions may have value as biomass products, but do not have a commercial value as lumber products.

This treatment applies to land designated as Late Successional Reserve, Known Spotted Owl Activity Centers (100 acre Late Successional Areas), Riparian Reserve and Matrix encompassing 364 acres. Refer to Table A1. Proposed Treatment Prescriptions Acreage by Land Allocations. Fuel treatments may be applied as prescribed fire only or as a combination of prescribed burning, hand or mechanical density reduction (thinning), hand or mechanical piling, or chipping. Treatments may be followed on an as needed basis by thinning and prescribed fire to reduce surface fuels or maintain them in the desired condition.

A1.1 Thinning Treatmen

The thinning treatment shall be applied to reduce the number of trees per acre. Residual tree spacing shall range from approximately 15-30 feet. Spacing may vary by 25% less or greater than the expressed range to allow for variability of density and selection of the best leave trees. Implementation may be by hand (chainsaw) or mechanized equipment (i.e. masticator or feller-buncher), depending upon slope constraints as described in the design features.

Retain the largest and most vigorous trees. The desired leave tree selection priority is as follows: hardwoods, sugar pine, Douglas-fir, and ponderosa pine. Retained hardwood sprout clumps should be thinned to retain the 2-3 most vigorous, dominant sprouts. Prune the lower branches of leave trees as needed to raise the canopy height and reduce ladder fuels. Where available retain any existing predominant tree.

Where feasible, avoid thinning pine-dominated plantations between February 1 and July 15 to avoid creating conditions for potential bark beetle breeding and outbreaks, unless slash can be promptly disposed of by chipping, mastication, removal or burning.

A1.2 **Snag Retention**
No snags >10" DBH shall be felled, unless deemed a safety hazard or risk to prescribed fire control. Hazardous snags will be felled and remain on site as coarse woody debris (CWD).

Back Fire Exception: For those units, or portions thereof, that were affected by the 2008 Back Fire retain a minimum of 4 large snags per acre minimum diameter 15 inches and preferably >20inches DBH, unless deemed a safety hazard; if there are less than 4 snags/acre >20" DBH, retain the 4 largest snags available (Late-Successional Reserve Assessment, pg. 52).

A1.3 **Coarse Woody Del**
Retain existing large CWD (≥20 inches in diameter, or largest available) up to a total of 5-10 tons/acre.

A1.4 **Surface and Ladde**
Slashing/fuels treatments:
Treated material would consist of existing surface downed woody debris and slash created from thinning treatments. Material would either be chipped and distributed throughout the treatment area, burned on site in piles (hand or mechanically piled), or taken off site. Trees may be pruned to raise canopy base height.

A1.5 **Riparian Reserve T**
Refer to **Treatment Prescription 7 Riparian Reserve Management** for specific operations within Riparian Reserve.

A2 Treatment Prescription 2 - Ecological Fuel Reduction Treatment -- Naturally Forested Areas

Treatment 2 is an understory thinning prescription that is a fuel reduction treatment applied to forested areas that express early, mid or late successional structure. The treatment will be applied to trees that depending on market conditions may have value as biomass products, but do not have a commercial value as lumber products.

This treatment applies to land designated as Late Successional Reserve, Known Spotted Owl Activity Centers (100 acre Late Successional Areas), Riparian Reserve and Matrix encompassing 3523 acres. Refer to A1. Proposed Treatment Prescriptions Acreage by Land Allocations. Treatment 2 may be applied as prescribed fire only or as a combination of prescribed burning, hand or mechanical density reduction (thinning), hand or mechanical piling, chipping, or pile burning. Treatment 2 may be followed on an as needed basis by prescribed fire to reduce surface fuels including activity fuels and maintain them in the desired condition.

A2.1 **Understory Thinni**
Where natural stand development has created areas that contain trees less than or equal to 10 inches DBH, understory thinning shall focus on the reduction of trees less than or equal to 10 inches DBH. Residual trees within these areas may be spaced15-20 feet in the understory of larger trees as long as there is spatial crown separation between the base of the upper canopy and lower canopy trees. Leave trees should not have potential to grow into the canopy of larger diameter dominate or co-dominate trees. Spacing may vary by 25% to allow for variability of density and selection of the best leave trees. Implementation may be by hand (chainsaw) or

mechanized equipment (i.e. masticator or feller-buncher), depending upon slope constraints as described in the design features.

Retain the largest and most vigorous trees. The desired leave tree priority would be as follows: hardwoods, sugar pine, ponderosa pine, and Douglas-fir. Retained hardwood sprout clumps should be thinned to retain the 2-3 most vigorous, dominant sprouts. Prune the lower branches of leave trees as needed to raise the canopy height and reduce ladder fuels. Retain any existing predominant trees where available.

Where feasible, avoid thinning pine-dominant areas between February 1 and July 15 to avoid creating conditions for potential bark beetle breeding and outbreaks, unless slash can be promptly disposed of by chipping, mastication, removal or burning.

Exception Clearance around Individual Trees: Trees less than 20 inches DBH may be removed from around individual large diameter conifer trees and hardwood species. This treatment may enhance individual tree growth potential and longevity. When removal is applied to trees that are of size to provide large woody debris, they may be left to enhance woody debris retention where needed.

A2.2 Snag Retention

No snags >10 Inches DBH shall be felled, unless deemed a safety hazard or risk to prescribed fire control. Hazardous snags will be felled and remain on site as coarse woody debris (CWD).

Back Fire Exception: For those units, or portions thereof, that were affected by the 2008 Back Fire retain a minimum of 4 snags >20” DBH, unless deemed a safety hazard. If there are less than 4 snags/acre >20” DBH, retain the 4 largest snags available (Late-Successional Reserve Assessment, pg. 52).

A2.3 Coarse Woody Del

Retain existing large CWD (>20” diameter, or largest available) up to a total of 5-10 tons/acre.

A2.4 Surface and Ladde

Slashing/fuels treatments
Treated material would consist of surface downed woody debris and slash created from thinning treatments. Material would either be chipped and distributed throughout the treatment area, burned on site in piles (hand or mechanically piled), jackpot or understory burned, or taken off site. Treatment objective maintain 5-10 tons/acre. Trees may be pruned to raise canopy base height.

A2.5 Riparian Reserve Treatments

Refer to **Treatment Prescription 7 Riparian Reserve Management** for specific operations within Riparian Reserve.

A3 Treatment Prescription 3 –Ecological Fuel Reduction Treatment -- Commercial Thinning

The initial treatment follows LSRA guidelines to treat within forested areas to protect forested areas before treating bordering non-forested areas. (LSRA pg. 45) This treatment prescription will be applied to various forested areas that express mid or late successional structure which are located on or near ridgetops or upper slopes. Treatment operations would utilize whole tree removal methods, or removal of the last log with tops still attached. Tree removal will be accomplished by a ground-based system. Activity fuels not brought to the landing during operations may be hand or machine piled and burned if levels exceed desirable surface loading for subsequent prescribed underburning. Slash brought to the landing would be burned on site or utilized as biomass feedstock in on or off site processors, or returned to the various locations within the units. When activity fuels are relocated within the unit they may be treated by burning or left in place as CWD. Post-harvest prescribed underburning would be utilized to further reduce fuel loading.

The intent of the prescription is to promote or sustain late successional habitat by working within current stand heterogeneity. The current heterogeneity is expressed in the variable density found in stand structure as related to tree size distribution, stem spatial patterns, species composition and stand dynamic processes (growth, mortality and regeneration). Ecological enhancement thinning will incorporate the intermediate silvicultural practice thinning from below combined with certain aspects of variable density thinning.

Applied ecological enhancement thinning treatments aim to enhance biodiversity through focusing tree retention on leave trees that provide habitat with structural diversity more suitable to late successional species. Ecological enhancement thinning addresses appropriate tree density reduction to open the lower story canopy to enhance NSO habitat, reduce competition and develop resiliency.

A3.1 Thinning from Belo

Thinning From Below is a silvicultural technique in which lower story trees (usually subdominant trees) are removed. The objective is to reduce the density by increasing the spatial separation between the trees that make up the lower story canopy and the trees that make up the upper story canopy.

Thinning from below will serve to reduce ladder fuels, help raise stand height to crown base, and separate overstory tree crowns from lower story tree crown. Only minor removal of codominant trees which along with dominant and predominant trees provide the canopy structure characteristic that expresses suitable NSO and late successional habitat. No dominant or predominant trees will be removed.

A3.2 Variable density th

Variable density thinning is a thinning approach used to create, sustain or restore spatial, structural and compositional heterogeneity throughout the stand. Thinning shall strive to maintain the current mosaic of variable species composition and habitat niches. This approach modifies a traditional thin from below so that a stand is not uniform following treatment. Variable density thinning concept strives for variation in the residual stand, not uniformity.

Elements of variable density thinning that will be incorporated into this project to create or enhance spatial heterogeneity in composition and structure similar to that found in late-successional forests include:

6. Different thinning intensities among units based on seral stage and whether the stand is northern spotted owl nesting/ roosting, foraging or dispersal habitat

7. Some portions of the stand may not be entered to remove trees greater than 10 inches, but may have tree less than or equal to 10 inches removed. Also, prescribed fire may be applied. (Skips).

8. Some portions of the stand may favor hardwood group retention.

9. Some portions of the stand may have lesser spacing retention objectives for large diameter trees and larger spacing retention objectives for smaller diameter trees.

10. Some portions of the stand may have a requirement for greater clearance around a particular tree species.

The proposed thinning would be applied on approximately 1702 acres of mixed conifer stands. Refer to Table A1. Proposed Treatment Prescriptions Acreage by Land Allocations. The treatment goal is to sustain a stand that:

6) Continues to provide spotted owl habitat;
7) Provides habitat for other late-successional species;
8) Is more resilient to fire;
9) Possesses, protects and develops an adequate component of larger trees with cavities and defects for nesting/roosting structures, foraging opportunities and dispersal qualities; and
10) Is of appropriate density to maintain the stand in a reasonably vigorous and healthy condition to extend the retention of the large, mature trees and other attributes of suitable late successional habitat such as snags and coarse woody debris(CWD) for as long as possible.

The treatment focus is to retain the largest trees that express late seral elements and promote healthy black oak and madrone trees wherever possible. The larger diameter trees are generally at or above the average canopy and have the best opportunity to take advantage of onsite resources to maintain or increase growth. The larger diameter trees generally express a higher degree of fire resiliency. Treatments are designed to maintain the existing native species diversity, including hardwoods, within the unit being treated. The treatment will emphasize retaining the following types of trees:

- All pre-dominant conifer trees (larger, older trees left from previous stands that express late seral structural elements such as large branches, cavities and other structures suitable for nesting, denning and resting), and diameters generally greater than 39 inches DBH;

- All dominant conifer trees as required by the LSRA. Tree diameters are generally 30 to 38 inches DBH;

- Codominant and intermediate conifer trees with growing space in the canopy for crown development. These trees express live crown ratios generally greater than 30 percent and diameters generally less than 30 inches;
- Healthy dominant or codominant hardwood trees (particularly black oak and Pacific madrone).

The treatment will develop species specific retention areas and species specific individual tree growing space enhancement:

- **Retention Areas (Skips):** These areas will not be treated to remove trees greater than 10 inches DBH. They are small areas generally one half acre to two and a half acres which contain coarse woody debris (CWD) concentrations, or hardwood concentration not requiring treatment to reduce conifer encroachment. These areas may be included in prescribed fire treatments.

- **Hardwood Retention Group Areas:** Hardwood retention group areas will be prescribed with the removal of encroaching conifer that are over topping the hardwoods and impeding their growth and vigor. Conifer trees will be removed from beneath the drip line and out to a distance of 5 feet from the hardwood crowns to enhance sunlight and growing space.

- **Variable Spacing Retention Objectives:** The retention objective for larger diameter trees shall focus on shorter spacing distance to maintain canopy closure. Smaller diameter trees spacing distances will focus on larger spacing distances to develop crown and stem diameter to encourage and to enhance late seral habitat structural characteristics.
- **Clearance Around Individual Trees:** Individual large diameter ponderosa pine, sugar pine and hardwood species with black oak being the predominant large diameter hardwood species shall be treated to enhance their growth potential and longevity by removing trees from the east, south and western quadrants to cause crown separation of a minimum of five feet from nearby trees canopies.

First priority for removal would be the smaller trees generally 20 inches DBH or less. These trees were established as a result of past harvest activities, or other disturbances. They are usually present below the average canopy and are impacting the larger diameter trees as a result of competition for light, water, and nutrients. Some codominant trees would also be removed to increase growth of adjacent trees and to meet the desired residual stand density. Generally, the following types of trees would be removed from the stand:

- Suppressed conifers (diameters generally less than 14 inches);
- Intermediate conifers without growing space in the canopy for crown development (diameters generally less than 20 inches);
- Codominant conifers that do not have growing space in the canopy for further crown development (diameters generally less than 24 inches), or
- Codominant trees needed to reduce stand density to desired levels; and

- Codominant, intermediate, and suppressed conifers adjacent to pre-dominant conifers, or dominant / codominant hardwoods, to enhance survival of theses leave trees.

The treatment will retain wildlife habitat elements:

- **Snags:** Retain all snags >20” DBH, unless deemed a safety hazard or which have the potential to spread fire (fall/spot) across control lines. Hazardous snags and snags >20 inches DBH felled to facilitate burning operation will be retained as coarse woody debris (CWD).
- **Coarse Woody Debris:** Retain existing large CWD (>20” diameter, or largest available) up to a total of 5-10 tons/acre.

A3.3 Riparian Reserve

Refer to **Treatment Prescription 7 Riparian Reserve Management** for specific operations within Riparian Reserve.

A4 Treatment Prescription 4 - Ecological Fuel Reduction Treatment -- Shaded Fuel Break

Shaded Fuelbreaks are a fuel-reduction technique for forested areas where vegetation is reduced and/or modified to reduce fire hazard in strategic locations on the landscape. Shaded fuelbreaks treat surface, ladder fuels and tree canopy bulk density. This break in fuel continuity is expected to change fire behavior. Fuel reduction activities will create safer and more effective areas for fire-suppression efforts, and contribute to future prescribed fire activities. The proposed treatment would be applied on approximately 1040 acres of mixed conifer stands. Refer to Table A1. Proposed Treatment Prescriptions Acreage by Land Allocations. However, only 145 acres are not within other treatment units. The shaded fuel break is designed to be 500 feet in width covering 250 feet of each side of an associated road or may vary larger on one side or the other depending on slope or ridgetop location.

Where the fuelbreak passes through proposed treatment units, the appropriate unit-specific prescriptions would be applied. Therefore, within the fuelbreak the unit specific treatments would be applied in plantation areas or in naturally forested areas. In addition, prescribed fire may be applied. These treatments would be accomplished through mechanical and hand thinning, piling, and burning.

Where the fuelbreak does not pass though the proposed treatment units, the proposed fuelbreak treatment would be to thinning small diameter trees following Treatment Prescriptions 2. Where chaparral dominates, specifically the north end of the fuelbreak on slopes greater than 35% with high and very high erosion hazards, brush patches of up to 10-15 feet in diameter would be retained to a 30-50 feet spacing between adjacent brush patches.

A5 Treatment Prescription 5 - Ecological Fuel Reduction Treatment -- Chaparral Management

The treatment consists of using prescribed fire as the primary tool for strategic fuel reduction that breaks up the continuity of large chaparral fields without resulting in large-scale changes in habitat type. Prescribed fire use will stimulate chaparral regeneration, contribute to the development of, diversity in seral stages and reducing fuel loading. Prescribed burning will be conducted to minimize impacts to forested areas intermixed within areas dominated by chaparral fields. Protection measures may include activities such as using strategic ignition areas. Strategic ignition may include using tactics such as lightning above a forested area, lighting along a ridgelines, controlling distance between active ignitions, and using natural barriers. Prior to actual burning activities preparation operations may include hand or mechanical thinning of small diameter trees following Treatment Prescriptions 2, brushing of roads, fire line construction and brush removal.

Fire lines construction may be necessary in order to keep prescribed fires contained to unit boundaries, to protect certain features within unit boundaries (e.g. large snags, witness trees, or infrastructure), or to limit the area that is burned in a given day (e.g. for reasons of air quality). Burning would be performed by hand and/or aerial ignition sources. Within the treatment areas, a mosaic of burn severity would be created. In general, this mosaic would be based on existing vegetation conditions.

A5.1 Riparian Reserve T

Refer to **Treatment Prescription 7 Riparian Reserve Management** for specific operations within Riparian Reserve.

A6 Treatment Prescription 6 - Ecological Fuel Reduction Treatment -- Back Fire Area

The treatment consists of using prescribed fire for reducing surface fuel loading, reducing tree density and maintaining fire return interval within the 2008 Back Fire perimeter. Burning would be performed primarily by hand or aerial ignition sources. Thinning small diameters trees following Treatment Prescription 2 may be used to facilitate burning operations. Brushing of roads, line construction and brush removal may be done as preparation for burning. In addition, within areas of heavy surface fuel concentration, piling and pile burning, or jackpot burning may be utilized to facilitate burning operations. The treatment goal is to follow up on the naturally ignited 2008 Back Fire to continue to develop a fire interval that restores and enhances the burned area's ecological function.

A7 Treatment Prescription 7 - Riparian Reserve Management

Treatments within the identified protective buffers (e.g. Riparian Reserves, SMZs and other sensitive areas) would be undertaken to reduce stand density, enhance stand health, and decrease fuels. Thinning would increase the resiliency of the buffer to natural disturbance regimes, and this type of thinning is consistent with the ACS Objectives (BMP 1.19). The following prescription design features have been developed in response to RX 4 – Minimal Management (LRMP).

A7.1 Treatment Prescrip

- Vegetation that is designated for treatment within the SMZ would either be removed in the thinning operation or hand piled for burning (BMPs 1.19, 1.22, 1.6, and 1.8). Not burning hand piles or no treatment within the SMZ is permissible if fuels objectives are still attained.

- Prescribed burning would be conducted within Riparian Reserves and SMZ areas, but active ignition are prohibited within the SMZs. Burning may "back up" into the RRs and SMZs; however, fire would be suppressed if intensity is such that riparian vegetation or overstory canopy mortality would occur.

- **Exception-** No ignition will be allowed 300 feet of the fish-bearing reaches of Benmore Creek and Bucknell Creek.

- On slopes <40%, no hand pile burning would occur within 25 feet of the channel high water line.
  - ***Exception*** – hand piles may be located within 10-25 feet of the channel high water line if there is a topographic break (flat or bench with slope <20%). During burning, fire would not be allowed to creep outside the perimeter of the piled material, and the downhill perimeter of burn piles would remain unlit in order to retain some slash for ground cover and to function as a sediment trap.

- On slopes 40-60%, no hand pile burning would occur within 25 feet of the high water line, and shall include the following requirements:
  - Piling should utilize topographic features (flats, benches, or areas of least slope (10-20%), where available, to stabilize piles.
  - Slash should be piled with stems oriented with the slope to prevent rollout.
  - **Exception** – hand piles may be located within 10-25 feet of the channel high water line if there is a topographic break (flat or bench with slope <20%). During burning, fire would not be allowed to creep outside the perimeter of the piled material, and the downhill perimeter of burn piles would remain unlit in order to retain some slash for ground cover and to function as a sediment trap.

- On slopes >60%, slash may be lopped and scattered, and within the lower 10 feet of the SMZ the slash is to be moved upslope >10 feet from the channel high water line

A7.2 Treatment prescrip

- Within the outer portion of the riparian reserves, which is from the SMZ out to a total of 150 feet, the thinning prescriptions would be the same as the stand-specific prescriptions. Trees within the riparian reserve will be directionally felled in a manner to prevent impacts to stream banks.

- Within the inner portion of the riparian reserves referred to as the SMZ portion located from the high water line to 50 feet out only trees less than 10 inches DBH would be thinned from below on 15-25 foot spacing, with leave tree spacing dependent upon tree size and crown diameter.

- Retain all riparian obligate (near water dependent) vegetation, including within the RRs of seeps, springs, and unstable areas

- Tractor piling is not permitted within the RRs on slopes >25%; however, mastication or grapple piling is permissible within the RR, but outside of the SMZs on slopes <35%.

- Hand removal (with chainsaws or hand tools) of vegetation within the SMZ is allowed, with location and burning of piles to follow the SMZ guidelines below. Retain 70-75% of existing ground cover (litter/duff) in the SMZ.

- Retain canopy cover consistent with the unit prescription, with a minimum of 50% in intermittent and ephemeral SMZs, and 70% in perennial SMZs.

- On slopes of <50%, retain 70-75% of existing ground cover (litter/duff) in the SMZ, and 60-65% of existing ground cover (litter/duff/rocks) in the remainder of the riparian reserve.

- On slopes >50%, retain 70-75% of existing ground cover (litter/duff/rocks) in the entire riparian reserve.

- Cover bare soil areas that exceed 50 square feet with mulch or slash, at the ground cover level appropriate for the slope class, if the area is likely to deliver sediment to a stream.

Table A1 Treatment Prescriptions

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
3A	12	12		2, 3, 4	WLF	CC = 60-80%, 25-30' spacing, BA = 180-240	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	PR
3B	24	24		2, 3, 4	FH	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	PR
4	86	86		2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	PR – East of 17N23 M -- West of 17N23
5	29	29		2, 3		CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	M

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
6	113	113		2, 3, 4	FH	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	M
7	77	77		2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	PR
8	131	131		2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	M - NW corner PR - NE and SE corners
9	16	16		2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	M

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
12	32	32		2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	PR
13	59	59		2, 3	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Retain existing CWD >20" = 5-10 tons/acre.	PR
14	91	89	2	2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	PR
15	107	94	13	2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	PR

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16	59	59		2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre. In fuelbreak, 1 log/acre >50' from road.	PR
17	57	57		2, 3	FH	CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre + 4-5 tons/acre of slash < 3".	PR
18	133	9	124	2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre + 4-5 tons/acre of slash < 3". In fuelbreak, 1 log/acre >50' from road.	PR
19	20	20		2, 3, 4	FH	CC = 60-80%, 25-30' spacing, BA = 180-240	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre + 4-5 tons/acre of slash < 3". In fuelbreak, 1 log/acre >50' from road.	PR

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
21	23	23		2, 3, 4	FH	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre + 4-5 tons/acre of slash < 3". In fuelbreak, 1 log/acre >50' from road.	PR
22	20	20		2, 3, 4	FH	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Outside fuelbreak -- Retain existing CWD >20" = 5-10 tons/acre + 4-5 tons/acre of slash < 3". In fuelbreak, 1 log/acre >50' from road.	M - NW Corner PR - SE Corner
23	48	35	13	2, 3	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	M
24A	14	14		2, 3	FH	CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
24B	9	9		2, 3	FH	CC = 60-80%, 25-30' spacing, BA = 180-240	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR
24C	25	25		2, 3	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR
24D	21	21		2, 3	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR
25	12	12		2, 3	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR
26	57	57		2, 3	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Retain existing CWD >20" = 5-10 tons/acre.	PR
27	17	17		2, 3	FH	CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
28	11	11		2, 3	FH	CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR
29	38		38	2, 3	FH	CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR
30	10	10		2, 3	FH	CC = 40-60%, 30-35' spacing, BA = 120-160	Retain all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR
31	24	24		2, 3	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Within Back Fire – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. Outside Back Fire – keep all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR
32	45	45		2, 3	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Within Back Fire – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. Outside Back Fire – keep all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
33A	10		10	2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Retain existing CWD >20" = 5-10 tons/acre..	M - NW corner PR - E half
33B	18		18	2, 3, 4	WLF	CC = 60-80%, 25-30' spacing, BA = 180-240	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Retain existing CWD >20" = 5-10 tons/acre.	M - NW corner PR - E half
34	11		11	2, 3, 4	WRD	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Retain existing CWD >20" = 5-10 tons/acre.	PR
35	36	36		2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Retain existing CWD >20" = 5-10 tons/acre.	PR - N half M - S half
37	143	143		2, 3, 4	WRD	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Retain existing CWD >20" = 5-10 tons/acre.	PR

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
38	5	5		2, 3, 4	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Outside fuelbreak – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. In fuelbreak, 1 snag per 0.25 mile.	Retain existing CWD >20" = 5-10 tons/acre.	PR
39	59	59		2, 3	WLF	CC = 40-60%, 30-35' spacing, BA = 120-160	Within Back Fire – keep all snags >20" DBH, except hazard trees; if < 4 snag/ac >20", keep 4 largest. Outside Back Fire – keep all snags >20" DBH, except hazard trees.	Retain existing CWD >20" = 5-10 tons/acre.	PR - NW half M - SW half
40	36	32	4	1, 4	FH				M
41	37	26	11	1, 4	FH				M
42	30	30	0	2, 4	WRD				PR
43	13	13	0	1	FH				M
44	14	14	0	1	FH				M
45	17	17	0	1	FH				M
46	32	32	0	1, 4	FH				PR, some M
47	13	13	0	1	FH				PR
48	4	4	0	1	FH				PR
49	5	5	0	1	FH				PR
50	8	8	0	1	FH				PR

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
51	5	5	0	1	FH				PR
52	9	9	0	1	FH				PR
53	28	28	0	1, 4	FH				PR
54	17	17	0	1	FH				M, some PR
55	17	17	0	1	FH				M
56	19	19	0	1	FH				M, some PR
57	2	2	0	1	FH				PR
58	11	12	0	1	FH				PR
59	5	5	0	1	FH				PR
60	10	10	0	1	FH				PR
61	9	9	0	1	FH				PR
62	6	7	0	1	FH				PR
63	47	47	0	1	FH				M and PR
64	129	129	0	2, 4	WRD				M, little PR
65	914	738	177	2, 4	WRD				M and PR
66	177	178	0	2	WRD				M
67	58	59	0	2	WRD				PR
68	393	90	303	2	WRD				M and PR

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
69	224	224	0	2	WRD				M and PR
70	3	3	0	2	WRD				M
71	37	37	0	2	WRD				PR
72	16	16	0	2	WRD				PR
73	124	124	0	2, 4	WRD				PR
74	63	60	4	2, 4	WRD				PR
75	246	152	94	2	WLF				PR, little M
76	131	131	0	2	WRD				PR
77	361	361	0	6	WRD				PR
78	23	23	0	2	WRD				PR
79	83	83	0	6	WRD				PR
80	41	41	0	2, 4	WRD				PR
81	89	89	0	2	WRD				M, little PR
82	15	15	0	2	WRD				M
83	71	71	0	2	WRD				PR
84	40	40	0	2	WRD				PR
85	125	11	114	2, 4	WRD				½ PR, ½ M
87	242	210	32	2	WRD				PR, little M

Unit	Acres	LSR Acres	Matrix Acres	Activity Treatment	Treatment Emphasis WRD=Wildfire Risk Reduction WLF=Wildlife Habitat Enchantment FH=Forest Health Enhancement	Treatment CC = Canopy Closure (%) BA = Basal Area in square feet	Snag retention guidelines	Coarse Woody Debris (CWD)	VQOs R – Retention PR – Partial Retention M – Modification
88	644	354	290	5	WLF				PR, little M
89	1178	315	863	5	WLF				PR, little M
90	333	333	0	2, 4	WRD				PR, little M
Fuel BREAK	1040	823	217	1, 2, 3, 4	WRD				

Transportation Actions[5]: Some areas of the proposed treatment areas 6, 8, and 9 are not accessible to cost effective logging systems utilizing the existing system road infrastructure. To allow for the efficient achievement of the Forest Goals, new temporary roads would need to be constructed. Three existing non-system road prisms totaling approximately 1 mile in length would be utilized for this project. These roads would receive maintenance or reconstruction to allow for safe and efficient hauling operations. A total of .6 miles of new temporary road construction would also be needed to efficiently access treatment areas. At the completion of the project, all temporary road construction segments (existing non-system and new temporary road construction) would have all culverts removed, stream crossings restored, and be hydrologically stabilized. The entrances would be ripped and covered in slash to screen the entrance from view, and a barrier erected to effectively block further vehicular use. The only exception to this would be the road in Unit 8 that is under a separate NEPA analysis for a potential easement to adjacent property owners. If this easement is granted, the adjacent property owners would be responsible for maintenance and would be the only users of this road. There will be no temporary road construction or reconstruction within the 100-acre LSRs.

Road maintenance will be done by the purchaser on system roads needed for commercial harvest. This is generally includes three phases of the commercial harvest: pre-haul; during haul; and post-haul. Pre-haul would involve grading the roads, if necessary, and removal of a small slide(s) that developed during the winter. During haul involves grading the road to facilitate efficient movement of the log/transport trucks and safe access for USFS administrative personnel. It also includes dust abatement to protect water quality and provide for human safety. The post-haul maintenance is designed to return the road to pre- project condition by grading the roads to be smooth and drivable and drain freely, and to clean all culvert inlets along the haul route to ensure no debris has been left in the area of the inlets.

Dust palliatives (Magnesium chloride or lignin sulfonate) may be used by the purchaser on the main haul routes (primarily County Roads 303 and 22) to reduce the quantity of water needed to control the dust. Water drafting would be at designated sites along Clear Lake.

In addition to road maintenance activities associated with the commercial hauling, forest road 15N13 is proposed to be decommissioned and hydrologically stabilized to meet ACS objectives. This road is 0.8 miles of long and as a level 1 road it is supposed to be open to administrative use only. It has been determined that the road is no longer needed for administrative use and should be permanently closed.

[5] See Page 14 of the EA and maps on pages A-44 and A-45 of this appendix for changes made to temporary road construction for Alternative 2

Appendix B – Design Features

The following specific design features which mitigate specific impacts or set standards of retention would be incorporated into the proposed action in order to comply with Forest Service Policy, regulations, laws, and applicable standards and guidelines within the LRMP.

Fuels Design Features

F1: Limbs and tops from the cut trees would be left attached to the upper boles of the trees and skidded to the landings. This would significantly reduce the amount of ground fuels requiring treatment.

F2: Post-harvest slash and brush would be treated by hand piling and burning, jackpot burning, tractor piling and burning, mastication, or a combination of treatments, as appropriate, depending upon slope steepness.Jackpot and/or hand piling and burning of high concentrations of slash would occur in areas that cannot be tractor piled (generally sustained slopes exceeding 35%).

F3: Outside of the fuelbreaks, retain large logs (>20 inches in diameter, or the largest available) up to a total of 5-10 tons/acre, and 4-5 tons/acre of slash < 3 inches in diameter, which is to be in contact with the ground for soil protection and nutrient cycling. Retain all existing snags >20", except those that pose a safety hazard.

F4: Within the fuelbreaks, retain one large log/acre, not to exceed 5-10 tons/acre, and not located within 50 feet of a road. Retain at least 1 large oak/acre, where available, and 1 snag per quarter mile of the fuelbreak. Retained snags should be more than 1.5 tree heights away from the road.

Wildlife and Fish Design Features

WF1- Snag and Coarse Woody Debris

a. Maintain all existing snags >20"DBH unless they pose a safety hazard or risk to prescribed fire control. Hazardous snags and snags >20" DBH felled to facilitate burning will be retained as CWD.
    i. Within the Back Fire footprint, retain a minimum of four snags >20" DBH, unless deemed a safety hazard. If there are less than four snags per acre >20" DBH then retain the four largest snags available.
b. Retain existing large CWD (>20" diameter, or largest available) up to 5-10 tons per acre.
c. Within fuelbreaks
    i. Maintain one snag per quarter mile of fuelbreak

ii. Maintain CWD at one log per acre of largest available in decay class 1 or 2

WF2- Northern Spotted Owls

a. A LOP for northern spotted owls will be applied from February 1 – July 9 within ¼ mile of suitable nesting habitat to minimize the potential for direct or indirect take caused by smoke or noise.

iii. Once protocol surveys are completed for NSO (September 2017), this LOP will only apply to occupied nesting habitat and Activity Centers.

WF3- Bald Eagle

a. Due to the project's proximity to Lake Pillsbury, a LOP for bald eagle will be applied from January 1 – July 31 within a primary nest zone unless it can be determined that the bald eagles are not nesting. Primary nest zones are typically ½ mile around any known bald eagle nest.

WF4- Northern Goshawk

a. A LOP for northern goshawk will be applied from March 1 – August 31 within ¼ mile of active nest sites.

WF5- Fisher and Marten

a. A LOP for fisher and marten will be applied from February 1 – June 30 within ¼ mile of known denning sites.

WF6- Bats

a. A LOP will be applied from May 15 – April 15 if activities occur within 300 feet of any rock outcrop or other known roost structure of pallid or Townsend's big-eared bats or fringed myotis to minimize disturbance from noise.

WF7- Foothill Yellow-Legged Frog

a. A LOP will be applied from the first significant rain on or after October 15th through May 15 if work occurs within 300 feet of potentially suitable foothill yellow-legged frog habitat. Specific activities may be approved by the wildlife biologist depending on occupancy of the habitat and/or nature of the work.
b. Water drafting requires extending the LOP to July 30 if eggs or tadpoles are present.
c. At all times of the year, adequate screening on intake hoses is required to protect foothill yellow-legged frog and other aquatic species. Adequate screening has mesh spacing with holes no greater than 2 mm in size and the end of the hose should be in the deepest and swiftest available part of the stream or the deepest available part of the pond.
    i. In ponds, restrict drafting to maintain a minimum of 20 inches of water in the deep end.

WF8- Peregrine Falcon

a. A LOP for peregrine falcon will be applied from February 1 – July 31 if activities occur within ¼ mile of a known nest site.

Forest Health Design Features

FH1: To minimize the potential for introduction of Sudden Oak Death (SOD) onto the Forest, all contractor's equipment (including logging trucks, passenger vehicles, dozers, graders, loaders, skidders, chainsaws, climbing equipment etc.) capable of spreading foreign soil, seed, scion or other propagules shall be certified clean prior to entering the forest if it has last been used in one of the SOD-quarantined counties.

FH2: During project operations, identified superior trees would be protected from loss or damage, in order to retain their value as genetic and seed production sources.Identification bands and tags would be refreshed/replaced as needed.

FH3: Where feasible, avoid thinning pine-dominated plantations between February 1 and July 15 to avoid creating conditions for potential bark beetle breeding and outbreaks, unless slash can be promptly disposed of by chipping, mastication, removal or burning.

Cultural Resource Standards

During the implementation of this project, all NRHP-eligible or unevaluated cultural resources (n=26) will be protected from ground disturbing activities using the SPMs in Appendix E of the 2013 RPA. Activities that could potentially cause ground disturbance for this project include mechanical thinning, piling and burning, mastication, underburning and any connected activities (e.g., construction of roads, landings, water holes, etc.). If new cultural resources are discovered during project implementation, all work would cease in the area until assessed by an archaeologist.

The Standard Protection Measures utilized for this project are as follows in the table:

Table B1. STANDARD PROTECTION MEASURES (2013 RPA: Appendix E)

Site Number	Trinomial	Comments	1.1	1.1(a)(1)	1.3(2)	1.4	1.5	Other
O5O854OO099	CA-LAK-1195H	Evaluated 2006					X	
O5O854OO1OO	NONE		X		X			
O5O854OO121	CA-LAK-1095/H		X		X			
O5O854OO123	CA-LAK-2100	Not In a Unit						
O5O854OO18O	CA-LAK-1104H		X		X		X	
O5O854OO181	CA-LAK-1105/H		X		X			
O5O854OO182	CA-LAK-1106		X		X			
O5O854OO227	CA-LAK-1110		X		X			
O5O854OO234	CA-LAK-1189	Evaluated 2011					X	
O5O854OO235	CA-LAK-1190/H		X		X			
O5O854OO236	CA-LAK-1191		X		X			
O5O854OO237	CA-LAK-1192/H		X		X			
O5O854OO238	CA-LAK-1193		X		X			
O5O854OO239	CA-LAK-1216		X		X			
O5O854OO24O	CA-LAK-1217		X		X			
O5O854OO241	CA-LAK-1218H	Not In a Unit						
O5O854OO253	CA-LAK-1219		X		X			
O5O854OO26O	CA-LAK-1187		X		X			
O5O854OO41O	CA-LAK_1550H		X		X		X	
O5O854OO648	CA-LAK-2193		X		X			
O5O854OO654	New Site		X		X			
O5O854OO655	New Site		X		X			
O5O854OO656	New Site		X		X			
O5O854OO657	New Site		X		X			
O5O854OO658	New Site		X		X			
O5O854OO659	New Site		X		X		X	Class II, 2.2(b(1(B)))
O5O854OO662	New Site		X		X		X	
O5O854OO663	New Site		X		X			

1.1 = Flag and avoid site under 36 CFR 60.4(d)
1.1(a)(1) = Flag, avoid, and use buffer zone (enter size)
1.3(2) = Notify project planner, manager, and/or implementer (site locations)
1.4 = Protect through project modification, redesign, or elimination
1.5 = Monitoring
Other = Class II or Class III

Botany Design Features

B1: Include in all contracts a provision to extend protection to any sensitive plants listed on the Regional Forester's Sensitive Species List and to provide for halting operations in the vicinity of newly discovered populations after completion of the Biological Evaluation or NEPA document.

B2: Apply soil productivity standards for conservation of surface organic matter and large woody material (FSH 2509.18) to maintain fungi habitat components.

B3: Apply Mendocino LRMP standards and guides for woody material retention to maintain fungi habitat components.

B4: Include in all contracts a provision for equipment cleaning to reduce the introduction of noxious weeds.

B5: Where equipment and vehicles need to use roadsides near weed infestations, either flag the infestations for avoidance or manually remove all aboveground weed biomass.

B6: Monitor roadsides and treatment units for changes in weed occurrences for at least three years after treatments are completed. Implement weed control practices where necessary.

B7: If seeding is needed on any decommissioned roads, landings, and heavily used skid trails, use native species and/or non-persistent/sterile cereal grains. As an alternative to seeding consider covering exposed soils with duff from adjacent undisturbed sites.

B8: If needed, use only certified weed-free straw or mulch; use weed-free gravel for road surfaces.

Geologic Design Features

Thefollowingdesignfeaturesarecreatedtohelppreventhumaninducedmasswasting.

Theycoincidewiththeproject'sHydrologist'sandFisheriesBiologist'sdesignfeaturesforriparianreserves,streammanagementzones,hillslopes,steeproadcutsandotherareas(Bawdon,2016;Kwan,2016).Forexample,theHydrologistrequiresretentionofriparian-associatedvegetationwithinsprings,seepsandunstableareas,whichwouldhelpreducetheriskofmasswasting.Effectsoftheproposedactionandalternativesareanalyzedbasedproperimplementationofthe Hydrologist'sdesignfeaturesandthefollowingdesignfeatures.DesignfeaturesandBestManagement Practices(BMPs) fromtheprojectHydrologist(Kwan,2016, AppendixBandC) were considered duringeffectsanalysis.

CommontoallAlternatives

GE1-VegetationManagementinallAreas

-Anypost-treatmenthydrologicstabilizationshoulddirectwaterawayfrominnergorgesandunstableareas.Ifnotpossible,usewaterdispersalmeasuressuchasplacingslashandotherorganicmatterwithinwaterflowpathstoen-courageinfiltrationandreductioninflowvelocities.

-Mechanizedequipmentareexcludedfromslopesover35%

i.Exception:Mechanicalequipmentmayoperate,atthediscretionoftheSaleAdministrator,on*stable* slopes35%to40%uptoadistanceof100feetprovidedallotherdesignfeaturesarefollowed.Mechanicalentryintounstableareas,includinginnergorge,isprohibited.

-Oninterveningslopesgreaterthan65%,nocuttingoftrees>10inches.

-Roads

i.Onroadcut-slopessteeperthan65%andhigherthan10ft.,notrees>8inchesDBHwillberemovedfromthecutslopeorwithin20feetoftheup-peredgeofthecutbank.Pruningtreesforaccess/roadsafetyandvisibility,ortomeetfuelsobjectiveswouldbeallowed.Exception:ifitisdeterminedthatatreeposesasafetyhazardorwouldbesubjecttoblowdown,thetreemayberemoved(Kwan,2016,AppendixC).

GE2- Field-VerifiedUnstableAreas(includesactivelandslides,innergorges)

-Mechanicalequipmentareexcludedwithin50feetoftheseareasandwithin theseareas.

-Mechanicalremovalofvegetationisprohibitedwithinunstableareas.

-Theseareaswillbeflaggedonthegroundandnothinningoftrees>4inchesDBHwillbeallowedwithin50feetfromthetopedgeoftheseareas.Pruningoftreesandremovalofladderfuelstoattainfuelsobjectivesispermissible.

-Prescribedburning

i. Firewouldbesuppressedifintensityissuchthatriparianvegetationoroverstorycanopymortality wouldoccur

ii. Firemay“backinto”unstableareas;therewouldbenoignitionswithinunstableareas

-Within20feetofunstableriparianreserves,nothinningofgreaterthan4”DBHtreeswouldbeallowed.Notreeswouldbethinnedattheheadandtoesofactivelandslides.

-Duringfuelstreatment,nomechanicaltreeorfuelsremovalwouldbeallowed withinunstableareasunlessspecificallyexceptedwithspecificlowintensityactivities.

GE3- Rock

-Rockusedfortheprojectwouldnotoriginatewithintheprojectareaastherearено suitablesources.

-Norockmaterialwillbeborrowedwithintheprojectarea,includingexistingroadcuts.

GE4-NaturallyOccurringAsbestos

-NaturallyOccurringAsbestosisaminorhazardduringimplementationsince onlyonesectionofroadhasultramaficrock. Thesectionofroadisatthethroughfillatthejunctionof17N40and18N05.

-AProject SpecificJob Hazard AnalysisguideandmapsofpotentialNaturallyOccurringAsbestoswouldbeprovidedtoimplementationtohelpwithmiti-gationeffortsforhealthandsafety.

-
Mitigationeffortstoreduceimpactsonairqualitybyuseoftemporaryand/orsystemroadsthattraverset hroughultramaficrock(i.e.,serpentinite)shouldbetaken.Thisincludesdustabatementmeasuresandu seofairrecirculationinvehicles.

GE5- Groundwater

-Protectgroundwaterwithprohibitionofequipmententeringsprings,seeps, andwetareas.

GE6- Palentological Resources

-

Thoughtheprojectarea'sbedrockhasaVeryLow(1)orUnknown(3b)PotentialFossilYieldClassificat ion(PFYC),protectionsfromprojectactivitieswouldbeappliedifeligiblesitesarediscoveredduringf ieldworkorimplementation.

GE7- Skid Trails and Landings

-
Plannewskidtrailspriortooperationstominimizepassesandsurfacedisturbance;useexistingskidtrails andlandingswheneverpossible.

-Nonewfullbenchskidtrailsorpartialbenchskidtrailswouldbeconstructed.

-Avoiddrainingwatercontrolfeaturestowardsinnergorgesandotherunstableareas.

GE8- Road Decomissioning

-Placefillagainstcuts,gradingfillto2:1orthenaturalgroundslopeifsteeper than2:1

-For "Ghost Road,"construct water controlfeatures todrain north,away frominnergorges

-Pullbackanyfillthathassettledattheedgeoftheroad(primarilyon17N35)andplaceagainstroadcuts.

-FillremovalatPerennialandIntermittentStreamCrossings

-

Removeallfillsandpipesdowntonaturalground

-
Makechannelwidthatthecrossingstwotimesthenaturalchannelwidth Leaveexcavatedslope sonthesidesofthestreamatgradientsof2:1ornaturalgroundslopeifsteeperthan2:1

-Rockarmorchannelbedandbanksoncriticalstreamcrossingswithnoapparentbedrock

-Placesexcavatedfillsatleast300feetfromcrossings

-EphemeralChannelsandSwales

-

Allfillandpipesshouldberemovedfromephemeralchannelsandswales,andnaturaldrainagepatter nsre-established.Thebanksshouldmatchthenaturalground

-

Drainwaterfromseepsorspringsbyremovingfills.

GE9- Recommendations: Road Maintenance

-

Atthejunctionof17N40and18N05,drainallroadsurfacewatertothenorthinordertopreventdelivering watertotheactivelandslidesouthanddownslopeofthesaddle.

GE10- Design Features for Alternative 3

-

Whiletherearenoconcernsorissueswithreconstructionandconstructionofthetemporaryroadbetweenunits13and14,certainareasoftheprismarenothydrologicallystable.Thusitisnecessaryforthefollowingdesignmeasureinadditiontothoseinalternative2:

-Hydrologicallystabilizethe3.8milesofexistingprismbetweenunits13and14

Riparian, Watershed and Soils Design Features

SW1: Design Features Applicable to All Management Activities

The design standards listed below are needed to assure that the proposed activities do not result in unacceptable levels of erosion and sediment delivery to streams. This, in turn, will assure that the proposed activities will comply with State and Federal clean water laws and regulations. They also contribute to meeting R5 soil quality standards.

- All road maintenance activities will follow Forest road maintenance specifications.
- Any water bars installed post-harvest that are damaged by fuels activities will be repaired before the next precipitation event.
- Roads that intercept ground water and are wet at the time of operations will be rocked prior to use.
- Prior to October 15, erosion control work would be completed as units are completed, or if the National Weather Service forecast for the project area predicts that a precipitation even is likely (greater than 30% chance). After October 15, erosion work is kept up weekly, or prior to anticipated storms.
- Ground-based heavy equipment will be limited to stable slopes less than 35%. Occasional use on stable slopes up to 40% for a distance not to exceed 100 feet is acceptable.
- Mechanical operations would occur during dry soil conditions; typically May 15-October 15. Operating during these times will minimize impact and reduce the potential for increased erosion. However, dust abatement will most likely be needed to minimize dust. The hydrologist or soil scientist would be consulted if any question concerning soil operability arises.

- On road cut-slopes steeper than 65% and higher than 10 ft., no trees > 8 inches DBH will be removed from the cut slope or within 20 feet of the upper edge of the cutbank. Pruning trees for access/road safety and visibility, or to meet fuels objectives would be allowed. **Exception:** if it is determined that a tree poses a safety hazard or would be subject to blow down, the tree may be removed.

- Several small slides and slumps have been identified in the treatment units (See Geology Report, USDA 2017e). These areas will be flagged on the ground and no thinning of trees > 4 inches DBH will be allowed within 50 feet from the top edge of these areas. Pruning of trees and removal of ladder fuels to attain fuels objectives is permissible.
- Retain at least 50% ground cover (litter/duff/rock) across all treatment areas. Retention and even distribution of fine vegetation (rather than rocks) should be favored for ground cover and nutrient cycling.

SW2: Activities within the **Riparian Reserves** will be subject to the following requirements:

- Within the outer portion of the riparian reserves, which is from the SMZ out to the edge of the RR, the thinning prescriptions would be the same as the stand-specific prescriptions but no riparian associated vegetation will be removed.

- Retain all riparian-associated vegetation within the RRs of seeps, springs, and unstable areas

- Tractor piling is not permitted within the RRs on slopes > 25%; however, mastication or grapple piling is permissible outside of the SMZs on slope <35%.

- On slopes <50% retain at least 50% ground cover (litter/duff/rocks) evenly distributed across the treatment area.

- On slopes >50% retain at least 70% ground cover (littler/duff/rocks) evenly distributed across the treatment area.

- Cover bared soil areas that exceed 50 sq. ft. with mulch or slash to the ground cover percent appropriate for the slope class (see above) if the area is likely to deliver sediment to the stream.

- There are a number of perennial springs/seeps within the project area, where the riparian reserve width would extend 50 feet (for seeps < 1 acre in size) or 150 feet (for seeps > 1 acre) from the extent of water-dependent vegetation, or the break in slope, whichever is greater. No riparian would be cut within the water-dependent vegetation zone. Within the remainder of the riparian reserve trees < 8 inches in DBH would be hand thinned on a 20-25 foot spacing, retaining at least 70% canopy cover. There would be no ignition or burning of thinning slash within 50 feet of the flagline that marks the extent of water-dependent vegetation (BMPs 1.8, 1.18, 1.19, 7.3).

SW3: The following restrictions apply to all **Streamside Management Zones** (**SMZs**):

- No ground-based mechanized equipment or commercial harvest will be allowed in SMZ except in designated crossings. Crossings of intermittent and ephemeral streams will be approved by the district or forest hydrologist prior to implementation. Only existing controlled crossings (bridges and culverts) of perennial streams will be used.

- Within SMZs only trees < 10 inches DBH would be thinned on a 20-25 foot spacing. No trees > 4 inches DBH will be cut within the lower 10 feet of the SMZs.

- Trees cut in the SMZ must be felled toward the outer part of the RR. If it is necessary to remove the tree it should be end lined or grapple skidded from outside the SMZ, suspending one end where feasible and requiring full suspension over stream courses.

- Retain all riparian associated vegetation.

- Maintain a canopy cover of at least 70% in all intermittent and ephemeral SMZs in anadromous watersheds, and 50% in all intermittent and ephemeral SMZs.

- Maintain a canopy cover of at least 70% in all perennial SMZ.

- Retain 70% ground cover (litter/duff/rocks).

- Cover bare soil areas that exceed 50 sq. ft. with mulch or slash if the area is likely to deliver sediment to a stream.

SW4: Design Features Specific to **Commercial Thinning**:
The following design features apply to commercial harvesting activities, and are ***in addition to*** those listed above for all actions

- Waterbar spacing will follow the Sale Administration handbook
- Reuse existing skid trails and landings unless they are poorly placed (i.e. in a Riparian Reserve or through an unstable area) or designed (i.e. over steepen).
- Uphill skidding would be allowed on slopes up to 35% slope and sections shorter than 100 feet on slopes up to 40%
- Any soil displacement caused by the mechanical equipment greater than 4 inches in depth would be back bladed or waterbarred to prevent water concentration
- Not more than 15% of any harvest unit would be occupied by skid trails and landings. Units found to be above this limit would have the most heavily compacted skid trails sub-soiled or ripped such that the unit would be under the 15%.
- Grooves greater than 4 inches in depth left by ripping or sub-soiling would be back bladed or waterbarred
- Ripping/subsoiling would occur to a minimum depth of 18 inches or to bedrock whichever is less
- Temporary stream crossings will be removed, cleaned, and stabilized prior to the onset of the wet season (typically October 15).

- No commercial harvest will be done within any SMZs.
- Portions of units 23 and 24 (both “thin over 10-inches DBH) are underlain by soils with a high or very high erosion hazard rating. If tractor operations occur on these soils than special erosion control prevention measures will be required. These measures may include the use of additional ground cover by 10%.

SW5: DesignFeatures Specific **to Fuels and Pre-commercial treatments**:
The following design features apply to commercial harvesting activities, and are ***in addition to*** those listed above for all actions

- Prescribed burning will be conducted in such a way as to result in a low to moderate intensity fire
- In units previously harvested the masticating/shredding equipment would reuse the existing travel ways within the unit
- Masticators should walk on slash as much as possible
- Mechanical piling would be limited to the minimum necessary
- Mechanical piles would be clean (i.e. less than 10% soil in them)
- Any soil displacement caused by the mechanical equipment greater than 4 inches in depth would be back bladed or water-barred to prevent water concentration
- No ground based equipment will be allowed in the fish-bearing RR of Benmore Creek or Bucknell Creek.
- No equipment or mechanical tree removal would be allowed within unstable areas.
- No tree > 8 inches DBH will be cut within 25 feet of the top of the inner gorge of Benmore Creek
- Prescribed Burning may be conducted within Riparian Reserve, SMZ, and unstable areas, but active ignition is prohibited. Burning may “back into” the RR, SMZ, and unstable areas; however fire would be suppressed if intensity is such that riparian vegetation or overstory canopy mortality would occur.
    - **EXCEPTION:** Fire will not be allowed within 300 feet of the fish-bearing reach of Benmore Creek and Bucknell Creek

Pile burning in **SMZs** is restricted as follows:

- On slopes <40%, no pile burning would occur within 25 feet of the channel high water line.

  Exception – hand piles may be located within 10-25 feet of the channel high water line if there is a topographic break (flat or bench with slope <20%). During burning, fire would not be allowed to creep outside the perimeter of the piled material, and the downhill perimeter of burn piles would remain unlit in order to retain some slash for ground cover and to function as a sediment trap.

- On slopes 40-60%, no hand pile burning would occur within 25 feet of the high water line, and shall include the following requirements:
  - Piling should utilize topographic features (flats, benches, or areas of least slope (10-20%), where available, to stabilize piles.
  - Slash should be piled with stems oriented with the slope to prevent rollout.

  Exception – hand piles may be located within 10-25 feet of the channel high water line if there is a topographic break (flat or bench with slope <20%). During burning, fire would not be allowed to creep outside the perimeter of the piled material, and the downhill perimeter of burn piles would remain unlit in order to retain some slash for ground cover and to function as a sediment trap.
- On slopes >60% *slash is to be lopped and scattered, and within the lower 10 feet of the SMZ the slash is to be moved upslope >10 feet from the channel high water line.*

Best Management Practices

Forest management and associated road building in the steep rugged terrain of forested mountains has long been recognized as sources of non-point water quality pollution. Non-point pollution is not, by definition, controllable through conventional treatment means. It is controlled by containing the pollutant at its source, thereby precluding delivery to surface water. Sections 208 and 319 of the Federal Clean Water Act, as amended, acknowledge land treatment measures as being an effective means of controlling non-point sources of water pollution and emphasize their development.

Working cooperatively with the California State Water Quality Control Board, the Forest Service developed and documented non-point pollution control measures applicable to National Forest System lands. These measures were termed "Best Management Practices" (BMPs). BMP control measures are designed to accommodate site specific conditions. They are tailor-made to account for the complexity and physical and biological variability of the natural environment. The implementation of BMP is the performance standard against which the success of the Forest Service's non-point pollution water quality management efforts is judged.

The Clean Water Act provided the initial test of effectiveness of the Forest Service non-point pollution control measures where it required the evaluation of the practices by the regulatory agencies (State Board and EPA) and the certification and approval of the practices as the "BEST" measures for control. Another test of BMP effectiveness is the capability to custom fit them to a site-specific condition where non-point pollution potential exists. The Forest Service BMPs are flexible in that they are tailor-made to account for diverse combinations of physical and biological environmental circumstances. A final test of the effectiveness of the Forest Service BMP is their demonstrated ability to protect the beneficial uses of the surface waters in the State.

Best Management Practices, as described in this document have been effective in protecting beneficial uses within the affected watersheds. These practices have been applied in other projects within the Mendocino National Forest. Where proper implementation has occurred there have not been any substantive adverse impacts to cold water fisheries habitat conditions or primary contact recreation (etc.) use of the surface waters. The practices specified herein are expected to be equally effective in maintaining the identified beneficial uses. Stream condition inventory (SCI) plots have been established on Benmore Creek and Packsaddle Creek to monitor the effectiveness of the prescribed BMPs.

The following management requirements are designed to address the watershed management concerns. Most are BMPs from the Forest Service publication "Water Quality Management for National Forest System Lands in California" (USDA Forest Service, 2011). All applicable water quality BMPs shall be implemented. The implementation phase of the BMPs occur after a project is completed, but before the winter season. BMP monitoring of the project is done one year later after the project experiences one rainy season. A list of BMPs used within the Pine Mountain Project is as follows along with a brief summary of what each entails:

Timber Management Best Management Practices

1.1 Timber Sale Planning Process The objective of this practice is to incorporate water quality and hydrologic consideration into the planning process.

Application:D

esign Features, Forest Plan Consistency report, specification of operational BMP's, interdisciplinary team discussions, and incorporation of water quality protection measures in the Timber Sale Contact constitutes the incorporation of water quality and hydrologic consideration into the Pine Mountain Project.

1.2 Timber Harvest Unit Design The objective of this practice is to ensure that unit design would secure favorable conditions of water quality and quantity while maintaining desirable stream channel characteristics and watershed conditions.

Application:

The design of the units for the Pine Mountain Project were developed though interdisciplinary discussion in the field and office. The ID team was composed of specialists in the fields of Botany, Hydrology, Soils, Silviculture, Wildlife, Fisheries, Archaeology, and Biology.

1.3 Determination of Surface Erosion and Hazard for Timber Harvest Unit Design The objective of this BMP is to identify high erosion hazard areas in order to adjust treatment measures to prevent downstream water quality degradation.

Application:

High and Very High erosion hazard areas have been identified and are mapped in Appendix B. Preliminary unit designs and locations were modified based on eroion hazards and have resulted in the current unit layout.

1.4 Use of Sale Area Maps (SAM) and/or Project Maps for Designating Water Quality Protection Needs. The objective of this practice is to ensure recognition and protection of areas related to water quality protection delineation on project maps

Application:

The sale administrator and purchaser will review these areas on the ground prior to commencement of ground disturbing activities. Examples of water quality protection features that will be designated on the project map include:

1) Location of

streamcourses and riparian reserves to be protected

2) Wetlands

(meadows, lakes, springs, etc.) to be protected.

3) Unstable areas to be protected

1.5 Limiting the Operating Period of Timber Sale Activities: This practice is to ensure that the purchasers conduct their operations, including erosion control work, road maintenance, and so forth, in a timely manner, within the time frame specified in the Timber Sale Contract.

Application: The "Normal Operating Season" for planned harvest activities would be between April 15 and October 15. Operations may occur outside of this period if conducted in accordance with the Mendocino Wet Weather Operations Standards (WWOS). The Sale Administrator will close down operations due to rainy periods, high water, or other adverse operating conditions in order to protect resources.

1.6 Protection of Unstable Areas: This objective is to provide special treatment of unstable areas to avoid triggering mass slope failure with resultant erosion and sedimentation

Application: Unstable areas have been field mapped and will be included in Sale Area Maps. Design features prevent the cutting of trees that are acting to stabilize these areas. All temorary roads have been field checked to ensure their use will not have the potential to trigger mass movements.

1.8, 1.19 Streamside Management Zone Designation & Streamcourse and Aquatic Protection
The objectives of these measures are to designate a zone along riparian areas, streams, and wetlands that would minimize potential for adverse effects from adjacent management activities. Management activities in these zones are designated to improve habitat for riparian dependent species. Additionally, objectives of SMZ's are to provide for unobstructed passage of stormflows, control sediment and other pollutants from entering streamcourses, and restore the natural course of any stream as soon as practicable, where diversion of the stream has resulted from management activities.

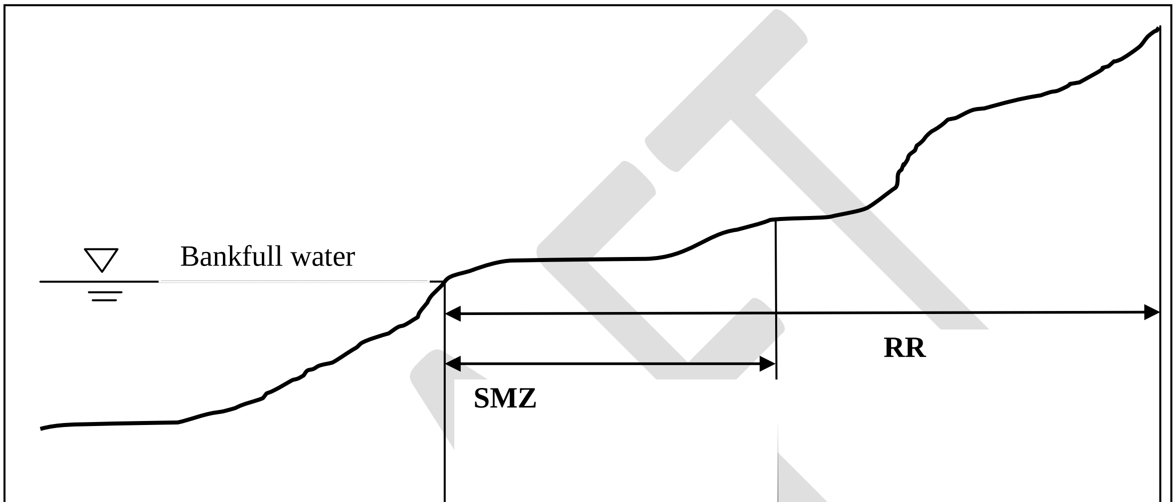
It is expected that development of Riparian Reserves (RRs) are included under these BMPs. RRs include aquatic and terrestrial ecosystems and lands adjacent to perennial, intermittent, and ephemeral streams, as well as around meadows. The purposes of RRs are to protect these areas as well as dependent natural resources during site-specific project planning and implementation. Forest Strategy also maintains or restores soil properties and productivity to ensure ecosystem health, soil hydrologic function and biological buffering capacity.

Application: Forest strategy provides direction to maintain or improve conditions for riparian dependent resources. Riparian dependent resources are those natural resources that owe their existence to the presence of surface or groundwater.

SMZ should not be considered replacement of RRs, but a nested zone contained in the RRs developed for the filtering capability of the streamside zone. All streamcourses would be protected and assigned SMZ's. The streamcourses mapped (Figure 3 in Hydrology Report, USDA 2017f) on the Project Area Map provides information for development of watercourse protection maps.

- Any material resulting from project activities causing obstruction of stormflows would be removed.

- All channels have designated SMZ’s, which is to be treated as an equipment exclusion zones. Material may be removed from this zone however heavy equipment is excluded.
- Table 1 below provides a summary of SMZ by Stream Class.
- No Borax would be applied within RRs and SMZs.
- Within RRs, reduce as much as possible ground disturbing impacts (ie, soil compaction, vegetation disturbances, etc). See table 2 for classifications and extent.
- BMPEP form T01 would be utilized to evaluate implementation on those units with SMZ’s and other aquatic protection.



RR and SMZ width for each streamclass:		
Streamclass	Riparian Reserve Buffer	StreamsideManagement Zone Buffer
Perennial	300’	The greater of 100’ slope distance or to the slope break
Intermittent	150’	The greater of 50’ slope distance or to the slope break
Ephemeral	100’	20’ (non-anadromous)
		50’ (anadromous)

Figure B1. RR and SMZ buffers.

1.9 Determining Tractor Loggable Ground

The objective of this practice is to minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems. Determination of tractor loggable ground considers the physical site such as steepness of slopes and soil properties.

<u>Application</u>: Ground skidding, mechanical piling, and masticating is limited to slopes less than 35%, with occasional operations on ground up to 40% slope for a maximum distance of 100 feet allowed.

1.10 Tractor Skidding Design

The objective of this practice is to design skidding patterns to best fit the terrain, the volume, velocity, concentration and direction of runoff water can be controlled in a manner that will minimize erosion and sedimentation.

Application: The sale administrator and purchaser will designate all skid trails prior to ground disturbing activities. Skidding would not occur in SMZ's. Skidding would occur on stable slopes not greater than 35%. Skidding would not occur down draws. Evidence of ruts associated or resulting from skidding pattern/path caused by the dragging of logs (or otherwise) would be water-bared. Additionally, if ground cover disturbance is reduced to amounts less than preexisting levels, these areas would be slashed through lop and scatter to 18 inches. Rutting is characterized by the sunken tracks or grooves usually made when the ground is wet or soft. Ruts for the purposes of this analysis, are at least 2 inches in depth.

- BMPEP form T02 would be utilized to evaluate implementation on those units where skidding would occur.

If uncertainty arises regarding potential resource impacts of skid trail location, consultation with an earth scientist (ie, hydrologist, geologist, or soil scientist) will be done. Existing skid trails will be used unless they are poorly located or designed.

1.11 Suspended Log Yarding in Timber Harvesting

The objective of this practice is to protect the soil mantle from excessive disturbance, maintain the integrity of the SMZ or other sensitive watershed area and to control erosion on cable corridors.

Application: Cable logging is not expected to be used in the Pine Mountain project due to project design. Endlining trees < 10 inches DBH from SMZs may be necessary and will be accomplished with one end suspended whenever feasible and with full suspension over any streamcourse.

1.12, 1.16 Log Landing Location, Log Landing Erosion Protection and Control

The objectives of this practice is to locate new landings or reuse old landings in such a way as to avoid watershed impacts and associated water quality degradation and reduce the impacts of erosion and subsequent sedimentation associated with log landings by mitigating measures.

Application:

The following criteria are to be used by the Sale Administrator when evaluating landings:

a. Utilize existing landings if they are not located in an SMZ or RR. In some cases, using an existing landing located within a RR is preferable to constructing a new landing outside of it. These situations will be reviewed on a site-by-site basis by an earth science specialist (aquatics, hydrology, geology, or soils).
b. The cleared or excavated size of landings will not exceed that needed for safe and efficient skidding and loading operations. Trees considered dangerous will be removed around landings to meet the safety requirements of OSHA.
c. Selected landing locations will involve the least amount of excavation and fill possible. Landings must be located outside of SMZs.
d. Locate landings near ridges away from headwater swales in areas that will allow skidding without crossing stream channels, violating SMZs, or causing direct deposit of soil and debris to a stream.

e. Locate landings where the least number of skid roads will be required, and sidecast can be stabilized without entering drainages or affecting other sensitive areas. Keep the number of skid trails entering a landing to a minimum.
f. Position landings such that the skid road approach will be nearly level as feasible, to promote safety and to protect soil from erosion.
g. Construct stable landing fills or improve existing landings by using appropriate compaction and drainage specifications.

Landings will be properly cross-ditched, ripped (if soils are compacted), re-contoured (as necessary), and mulched after use and before the winter precipitation period, whichever comes first. Excess material not needed for erosion control can be piled and burned. Upon completion of the project or before the onset of the winter precipitation period, consult with the hydrologist or soil scientist to determine the need for additional soil protection measures.

- BMPEP form T04 would be utilized to evaluate implementation on those units with landings.

1.13, 1.17 Erosion Prevention and Control Measures during Sale Operations, Erosion Control on Skid Trails

The objective of these practices is to ensure that the purchasers operation will be conducted reasonably to minimize soil erosion.

Application: Timber purchaser responsibilities for erosion control will be set forth in the Timber Sale Contract. Equipment will not be operated when ground conditions are such that excessive damage will result. The kinds and intensity of control work required of the purchaser will be adjusted by the sale administrator to ground and weather conditions with emphasis on controlling overland runoff, erosion, and sedimentation. Prior to October 15, erosion control work would be completed as units are completed. After October 15, erosion work is kept up weekly, or prior to anticipated storms.

Erosion control measures would be implemented on all skid trails, tractor roads, and temporary roads. Erosion control measures must include, but are not limited to, cross ditches (water bars), organic mulch, and ripping. Cross ditches will be spaced according to the guidelines in the Sale Administrators Handbook. Water bar spacing may need to be decreased in units where soils have high and very high Erosion Hazard Ratings.

Any evidence of ruts associated or resulting from skidding pattern/path caused by the dragging of logs (or otherwise) would be water-bared. Additionally, if ground cover disturbance is reduced to amounts less than preexisting levels would be slashed through lop and scatter to 18 inches. Ruts for the purposes of this analysis, are at least 2 inches in depth. Skidding would occur on ridge tops and not within draws. Standard road maintenance practices would be implemented.

If the purchaser fails to perform seasonal erosion control work prior to any seasonal period of precipitation or runoff, the Forest Service may temporarily assume responsibility, complete the work, and use any unencumbered deposits as payment for the work.

- BMPEP forms T02 and T05 would be utilized to evaluate implementation on those units where skidding operations and where erosion prevention and control measures are expected to occur.

1.20 Erosion Control Structure Maintenance
The objective of this practice is to ensure that constructed erosion control structures are stabilized and working.

Application: During the period of the Timber Sale Contract, the purchaser will provide maintenance of soil erosion control structures contracted by the purchaser until they become stabilized, but not more than one year after their construction. If the purchaser fails to do seasonal work, the Forest Service may assume responsibility and charge the purchaser accordingly. The Forest Service sale administrator is responsible for ensuring erosion control maintenance work is completed. T

- BMPEP form T05 would be utilized to evaluate implementation on those units with SMZ's and other aquatic protection.

1.21 Acceptance of Timber Sale Erosion-control Measures Before Sale Closure
The objective of this practice is to ensure the adequacy of required erosion control work on timber sales.

Application:

The sale administrator must inspect erosion control measures to ensure their adequacy prior to accepting closure on the unit and/or sale.

The effectiveness of erosion control measures will be evaluated using BMPEP protocols after the sale area has been through one or more wet seasons. This evaluation is to ensure that erosion control treatments are in good repair and functioning as designed before releasing the purchaser from contract responsibility.

The purchaser is responsible for repairing erosion control treatments that fail to meet criteria in the Timber Sale Contract, as determined by the Sale Administer, for up to one year past closure of the sale.

1.22 Slash Treatment in Sensitive Area
The objective of this practice is to maintain or improve water quality by protecting sensitive areas from degradation which would likely result from using mechanized equipment for slash disposal.

Application: Locations and specifications from piling and burning in RRs and SMZs are prescribed in the design features above.

Road Management Best Management Practices
2.2 General Guidelines for the Location and Design of Roads
The objective of this practice is to locate roads to minimize problems and risks to water; aquatic, and riparian resources. Incorporate measures that prevent or reduce impacts, through design for construction, reconstruction, and other route system improvements.

Application:

The following considerations are incorporated into the planning process of road location and design.

(a) The location and design of temporary roads were determined by the ID team and located to minimize potential impacts to water quality

(b) Sensitive areas such as wetlands, inner gorges, and unstable ground were avoided.

2.3 Road Construction and Reconstruction

The objective of this practice is to minimize erosion and sediment delivery from roads during road construction or reconstruction, and their related activities.

Application:

Newly constructed or reconstructed roads will be designed to reduce hydrologic connectivity and soil erosion. The sale administrator or other Forest Service representative will ensure that roads are adequately maintained during project implementation to ensure that road drainage features function as designed. Measures include construction of properly spaced cross drains, water bars or rolling dips, energy dissipaters, aprons, downspouts, debris racks, and armoring of ditches. Work will be done during the dry season, or when rain and runoff are unlikely. If possible, newly constructed “temporary” road should not be used for more than one season. Thus, this same road will be decommissioned post project according to specifications (BMP 2.7).

Construction and maintenance fill, sidecast, and end-hauled materials will be kept out of SMZ’s except at designated crossing sites to minimize the effect to the aquatic environment. In-channel excavation will only be done as needed to install and remove temporary road crossings. When removed, the streambed and banks will be restored to as natural a condition as possible. In-channel activities will not occur on perennial streams without further consultation with the district hydrologist and will require a dewatering plan. Slash generated by road work will not be disposed of into any watercourse or SMZ.

- BMPEP forms E08, E09, E11, E13, E14 will be used to evaluate the overall effectiveness of proper construction and reconstruction of roads.

2.4 Road Maintenance and Operations

The objective of this practice is to maintain roads in a manner which provides for water quality protection by minimizing rutting, failures, incorporation of slash into road fills, side-casting, and blockage of drainage facilities, all of which can cause erosion and sedimentation and deteriorating watershed conditions.

Application: Roads needed for project activities will be brought to current engineering standards of alignment, drainage, and grade before use, and will be maintained through the life of the project. The purchaser and the Forest Service would agree to an Annual Road Maintenance Plan that outlines responsibilities and timing of maintenance. This would be done before the beginning of the operating season.

Road maintenance and storm proofing activities will be designed to reduce impacts of roads to aquatic systems. Water or other dust palliatives will be used to control dust during operations.

2.5 Water Source Development and Utilization

The objective of this practice is to supply water for roads and fire protection while maintaining existing water quality.

Application: Water source development is normally needed to supply water for road construction and maintenance, dust control, and fire control. At no time would downstream water flow be reduced to a level that would be detrimental to aquatic resources, fish passage, or other established uses, and would require review and approval by District or Forest Hydrologist and Fisheries Biologist.

All drafting devices will utilize appropriate screens to protect aquatic organisms

- BMPEP form E16 would be utilized to evaluate implementation on those areas identified for water source development.

2.7 Road Decommissioning
The objective of this practice is to stabilize, restore, and vegetate unneeded roads to a more natural state as necessary to protect and enhance NFS lands, resources, and water quality.

Application:
Temporary roads will be obliterated after serving their intended purpose for this project. This includes: (1) road effectively barricaded; (2) road effectively drained by measures such as re-contouring or outsloping to return surface to near natural hydrologic function; (3) a well distributed mulch or organic cover provides at least 50% cover, or road surface is revegetated using local native species; (4) sideslopes are reshaped and stabilized to match the natural contour (as necessary); and (5) stream crossings are removed and natural channel geometry is restored.

- BMPEP form E10 would be utilized to evaluate implementation of road decommissioning and obliteration.

2.8 Stream Crossings
The objective of this practice is to minimize water, aquatic, and riparian resource disturbances and related sediment production when constructing, reconstructing, or maintaining temporary and permanent water crossings.

Application:
Crossings of intermittent and ephemeral streams will be approved by the district or forest hydrologist prior to implementation. Only existing controlled crossings (bridges and culverts) of perennial streams will be used.

- BMPEP form E09 would be utilized to evaluate potential effects of stream crossings.

2.11 Equipment Refueling and Servicing
The objective of this practice is to prevent pollutants such as fuels, lubricants, bitumens and other harmful materials from being discharged into or near rivers, streams and impoundments, or into natural or man-made channels.

Application: Storage of hazardous materials (including fuels) and servicing and refueling of equipment will be conducted at pre-designated locations outside of RRs. If fueling and/or storage of hazardous materials are needed within RRs, those sites must be reviewed and approved by the Forest Hydrologist. Additional protection measures, such as containment devices, may be necessary. Refueling and servicing of chainsaws may be permitted in RRs but not in SMZs

- BMPEP form E12 would be utilized to evaluate implementation on those areas that meet the requirements for servicing and refueling of equipment.

2.13 Erosion Control Plan
The Erosion Control Plan can be found in Appendix B.

Vegetation Manipulation Best Management Practices

5.2 Slope Limitations for Mechanical Equipment Operations
The objective of this practice is to reduce gully and sheet erosion and associated sediment production by limiting tractor use.

Application:

Ground skidding, machine piling, and masticating is limited to slopes less than 35%, with occasional operations on ground up to 40% slope for a maximum distance of 100 feet allowed.

5.3 Tractor Operation Limitation in Wetlands and Meadows
The objective of this practice is to limit turbidity and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion by excluding the use of mechanical equipment in wetland and meadows except for the purpose of restoring wetland and meadow function.

Application:

Tractors or other ground based machinery are not allowed in Wetlands or Meadows. Identified wetlands or meadows have will identified and flagged within units. Should any be encountered during implementation, this BMP is to be used.

5.6 Soil Moisture Limitations for Mechanical Equipment Operations

The objective of this practice is to prevent compaction, rutting, and gullying, with resultant sediment production and turbidity.

Application:

The Contract shall require winter shutdown whenever the Forest Service determines that the soil moisture or physical conditions have become unsuitable for equipment operation on any area. Soils will need to dry to acceptable levels before activities can resume. Consultation with district hydrologist or soil scientist will be as needed.

Fire Suppression and Fuels Management Best Management Practices

6.2 Consideration of Water Quality in Formulating Fire Prescriptions

This BMP provides for water quality protection while achieving management objectives through the use of prescribed fire.

Application:

Prescribed burning is planned at the minimum intensity and severity necessary to achieve management objectives, and each Burn Plan will incorporate all relevant design features from this EIS.

6.3 Protection of Water Quality from Prescribed Burning Effects

The purpose of this BMP is to maintain soil productivity; minimize erosion; and minimize ash, sediment, nutrients, and debris from entering water bodies.

Application: Burning within RR and SMZs would only occur during conditions where a low intensity burn would occur. Suppression would be required if fire intensity increases above this level. Any fire-lines created during fuels management activities would be water barred to reduce concentration of water. Active ignition utilizing broadcast burning would not be allowed within the RR, however fire would be allowed to back into the RR and SMZ. Fire will not be allowed into the SMZ of the fish-bearing portion of Benmore Creek or Bucknell Creek.

- BMPEP form F25 would be utilized to evaluate implementation of fuels management operations.

Watershed Management Best Management Practices

7.4 Oil and Hazardous Substance Spill Contingency Plan and Spill Prevention Control and Countermeasure (SPCC) Plan

The objective of this practice is to prevent contamination of water from accidental spills.

Application: A spill contingency plan and spill prevention and countermeasure plan (SPCC) must be prepared if hazardous materials (including fuels and oils) stored on the Mendocino National Forest exceed 1320 gallons, or if a single container exceeds 660 gallons.

The plan will at a minimum include: the types and amounts of hazardous materials located in the project area, pre-project identified locations for hazardous materials storage and fueling/maintenance activities (must be located outside of RRs), methods for containment of hazardous materials and contents of on-site emergency spill kit, and a contingency plan (including contact names with phone numbers) to implement in the event of a spill. The SPCC plan must be approved by the Forest Service prior to project implementation.

7.6 Water Quality Monitoring

The objective of this BMP is to collect representative water data to determine base line conditions for comparison to established water quality standards, which are related to beneficial uses for that particular watershed.

Application: This BMP is implemented through establishment of Stream Condition Inventory (SCI) sites prior to project implementation to establish pre-project condition. Two monitoring reaches were established on Benmore Creek and Packsaddle Creek. Reports of these surveys are contained in the Hydrology Report, USDA 2017f.

7.8 Cumulative Watershed Effects

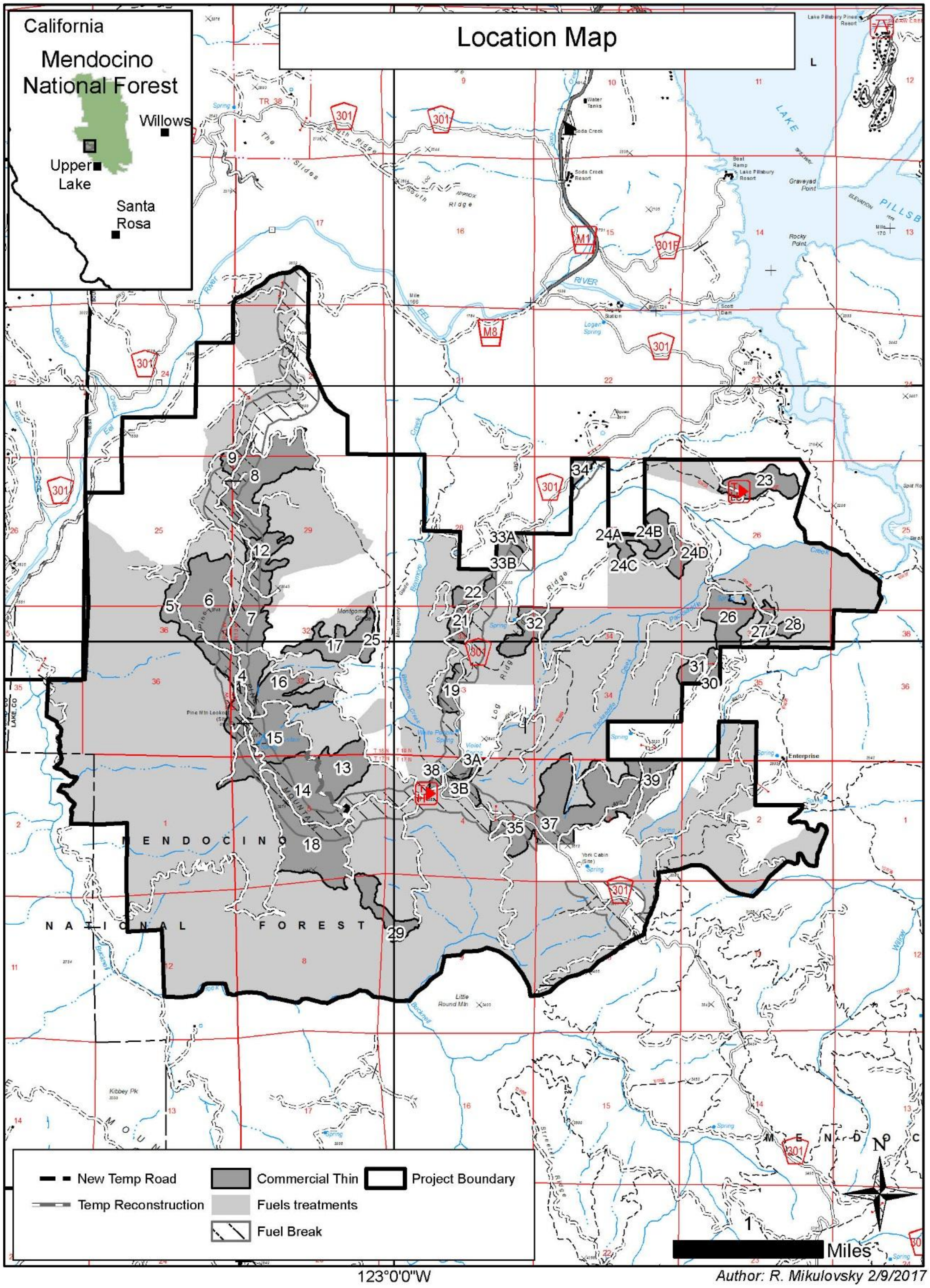
The objectives of this BMP is to protect the identified beneficial uses of water from the combined effects of multiple management activities which individually may not create unacceptable effects, but collectively may result in degraded water-quality conditions.

Application:

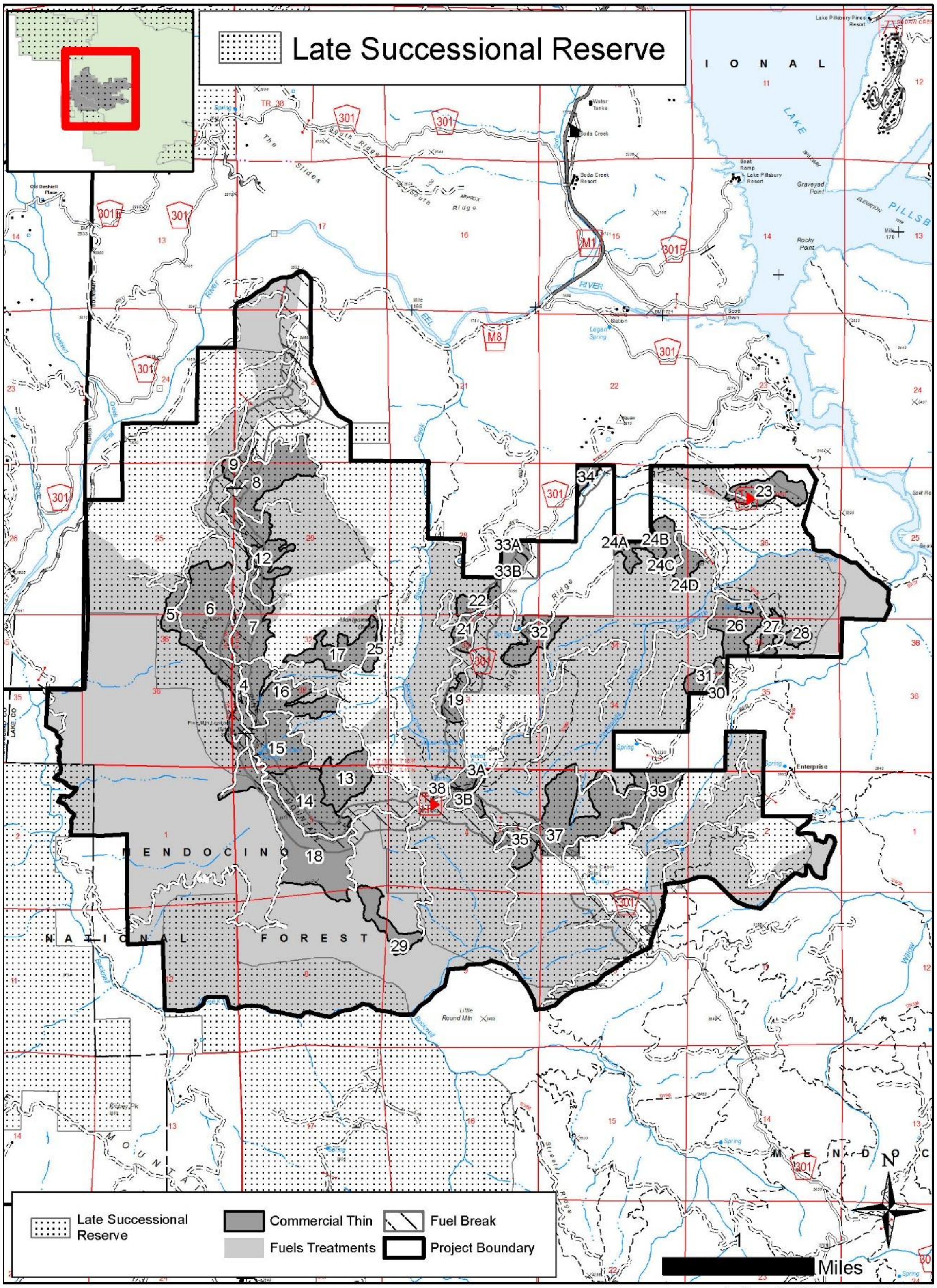
See the Cumulative Watershed Effects discussion in the Environmental Consequences section of the Hydrology Report (USDA 2017f).

Appendix C- Maps

-Overview Map (page **C2**)
-LSR Overview (page **C3**)
-Riparian Reserves (page **C4**)
-Alternative 2- Proposed Action (pages **C5-8)**
-Alternative 3- No New Temporary Road Construction. No map depicted for this alternative since all activities will remain the same with the exception of the creation of New Temp Road. This new temporary road location can be seen in Area 2 maps of Alternatives 2 and 5.
-Alternative 4- No Commercial Harvesting in Riparian Reserves (pages **C9-12**)
-Alternative 5- No Commercial Harvesting in Northern Spotted Owl Nesting/Roosting (4 units. (page **C13)**



Location Map
California
Mendocino National Forest
Willows
Upper Lake
Santa Rosa
39°24'0"N
123°0'0"W
New Temp Road
Temp Reconstruction
Commercial Thin
Fuels treatments
Fuel Break
Project Boundary
1
Miles
M E N D O C I N O
N A T I O N A L F O R E S T
Author: R. Mikulovsky 2/9/2017



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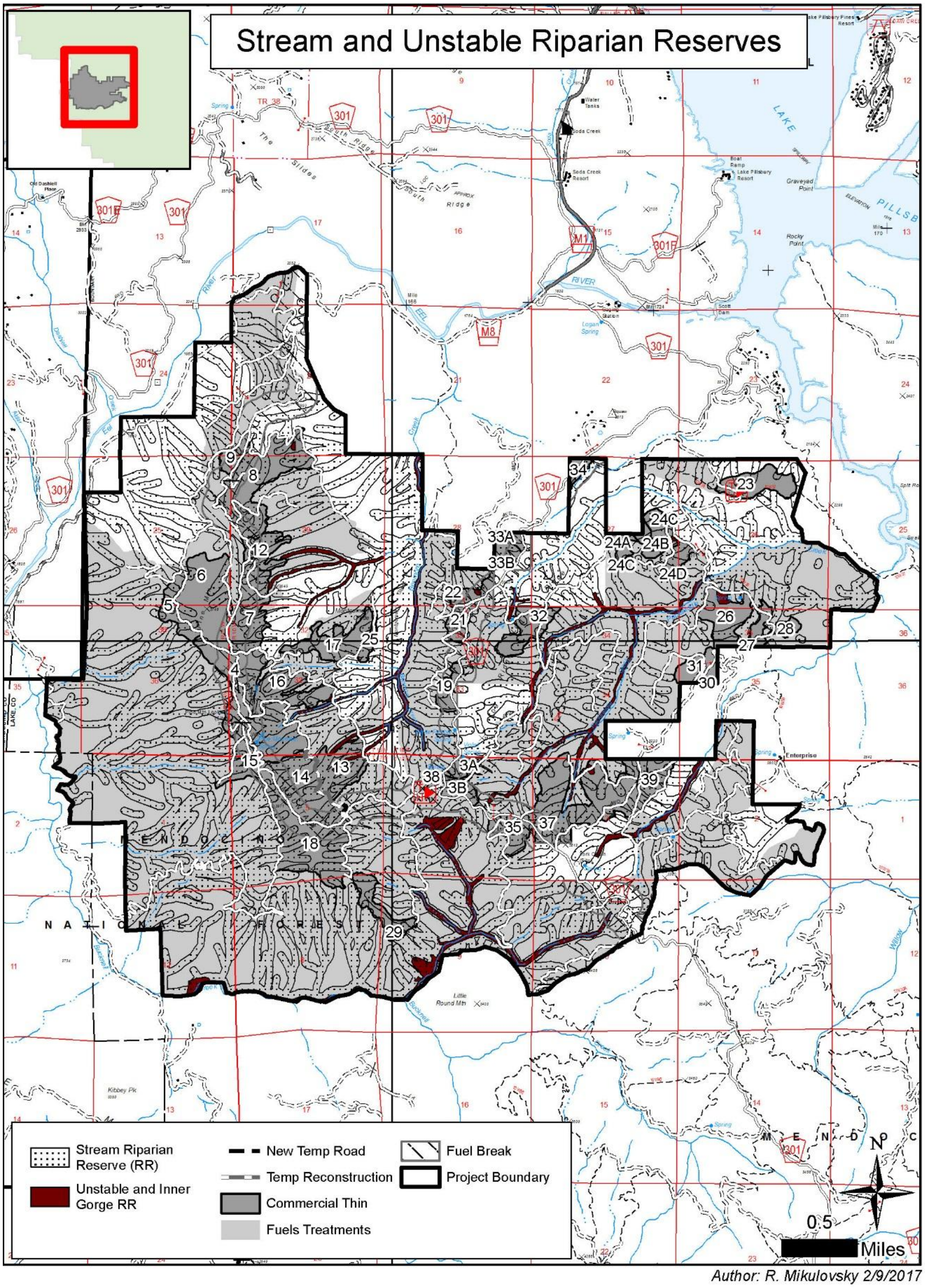
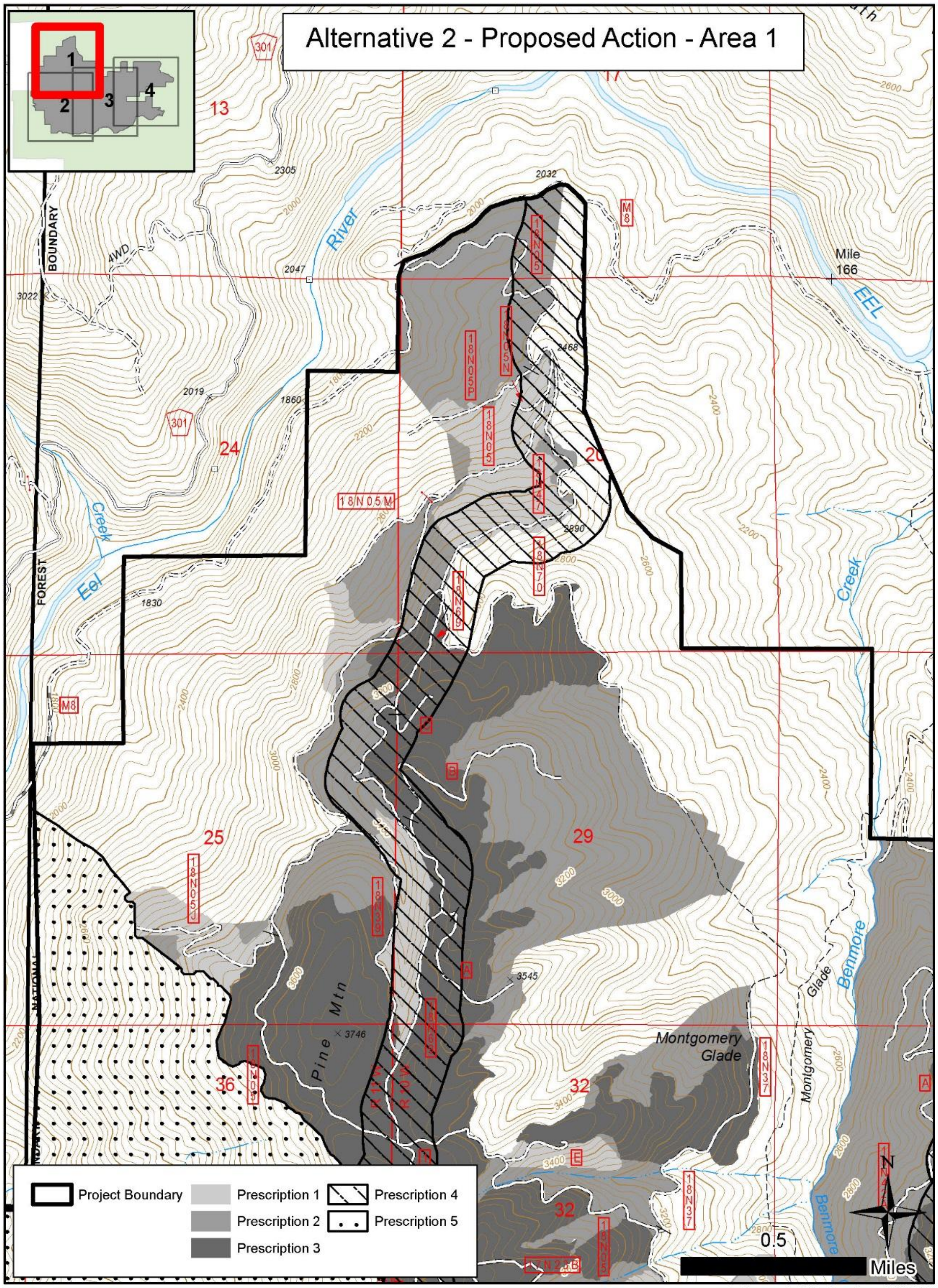

Stream and Unstable Riparian Reserves
Stream Riparian Reserve (RR)
Unstable and Inner Gorge RR
New Temp Road
Temp Reconstruction
Commercial Thin
Fuels Treatments
Fuel Break
Project Boundary
0.5
Miles
Author: R. Mikulovsky 2/9/2017

Alternative 2



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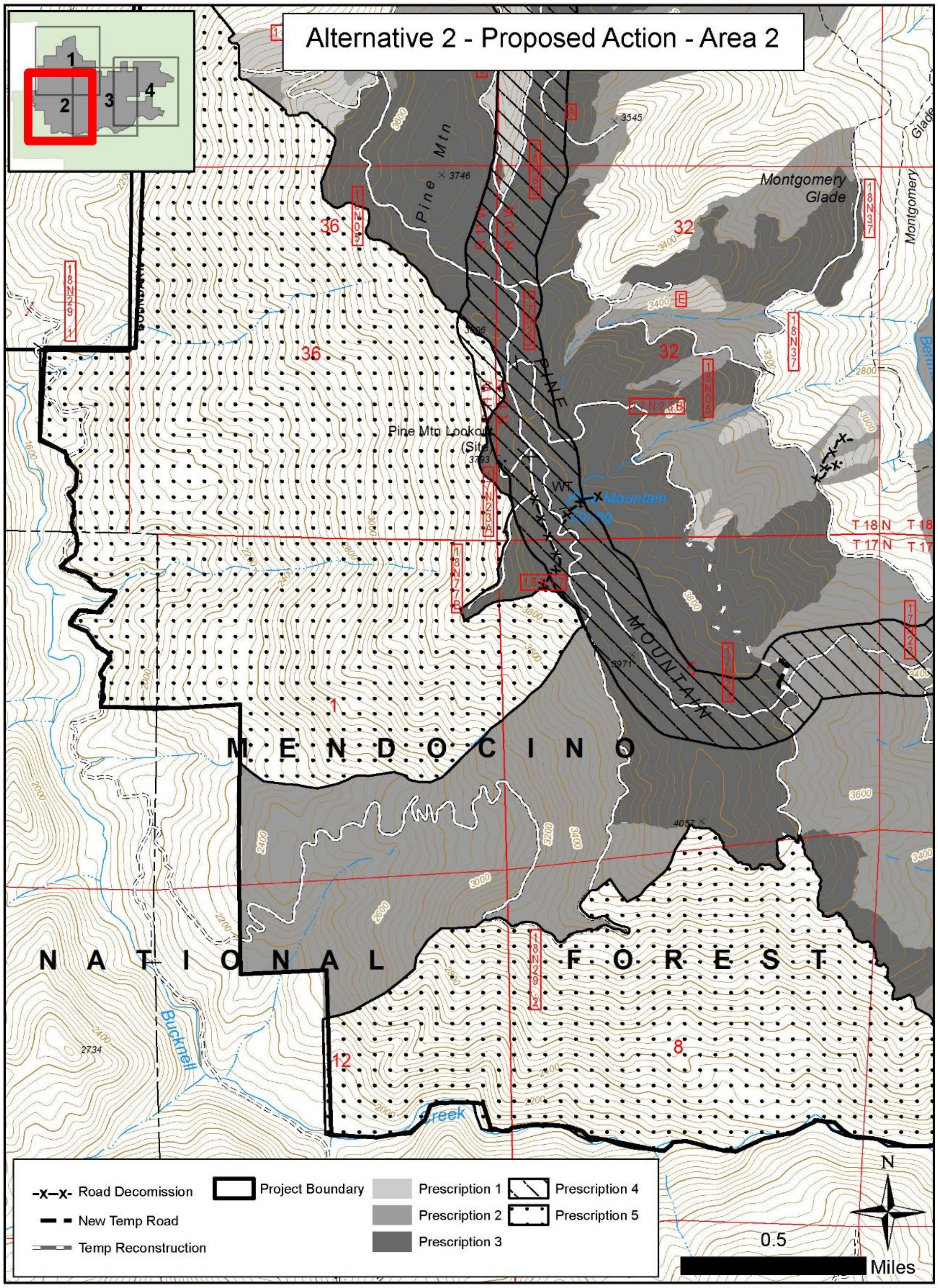

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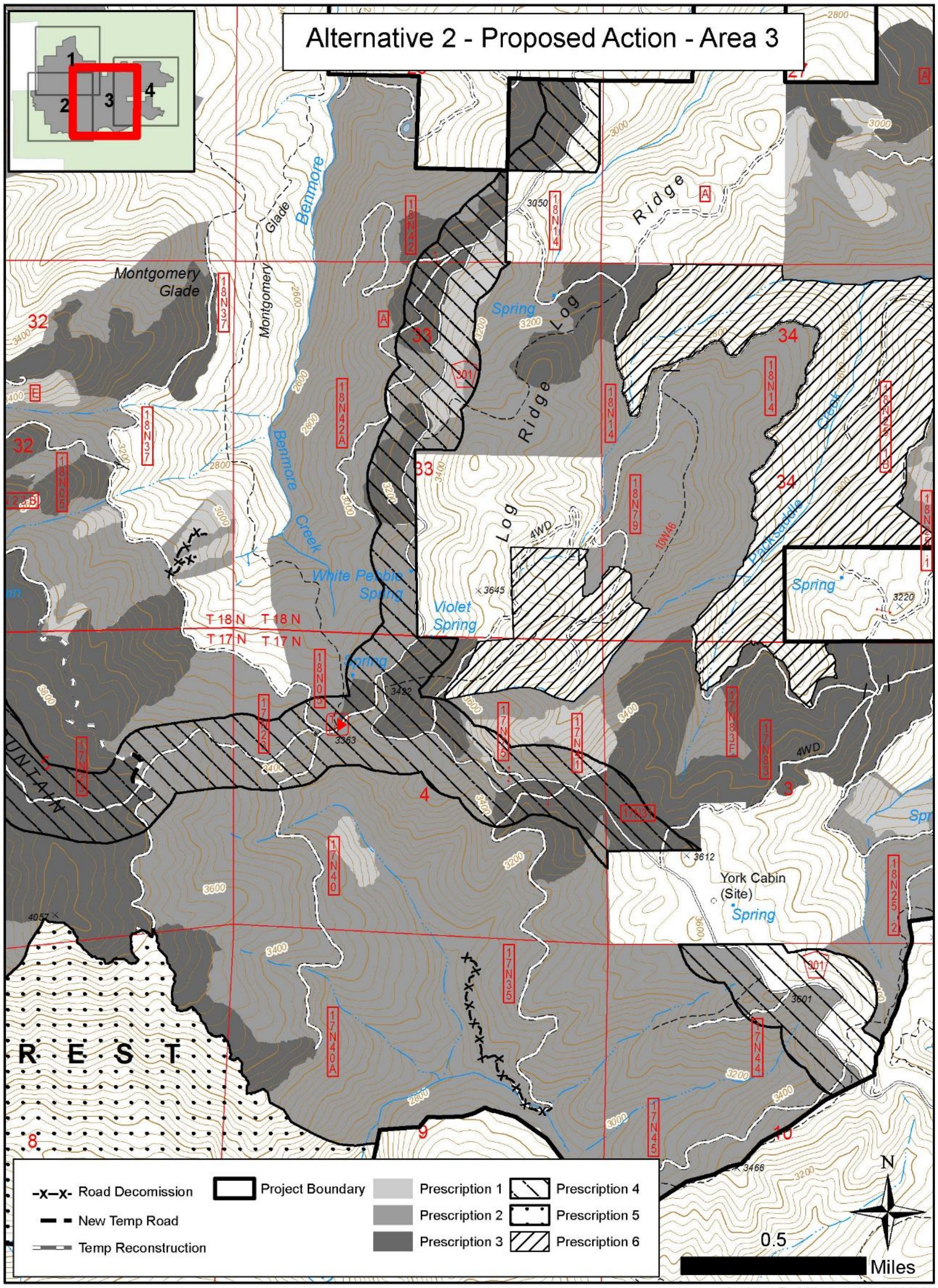

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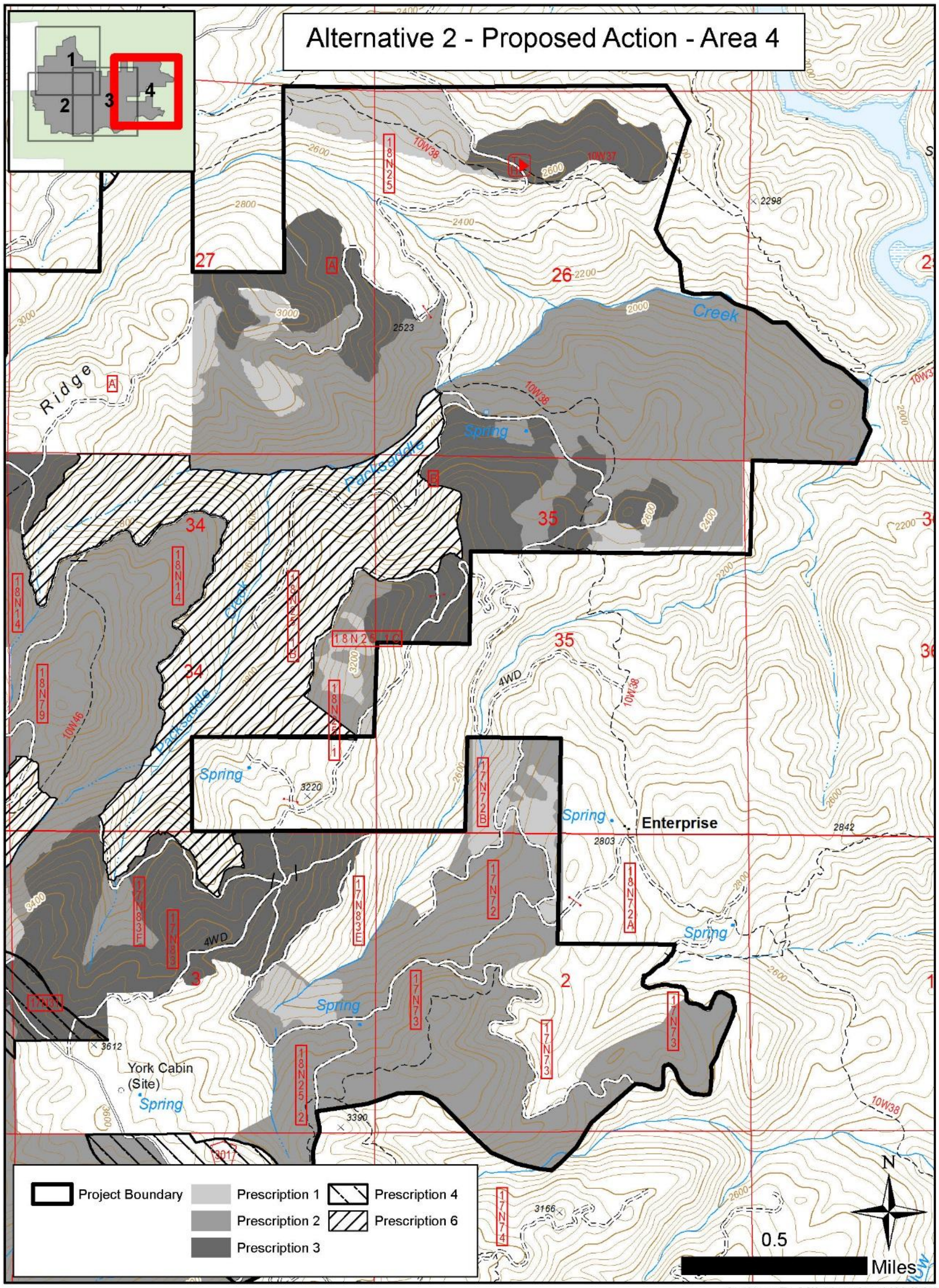

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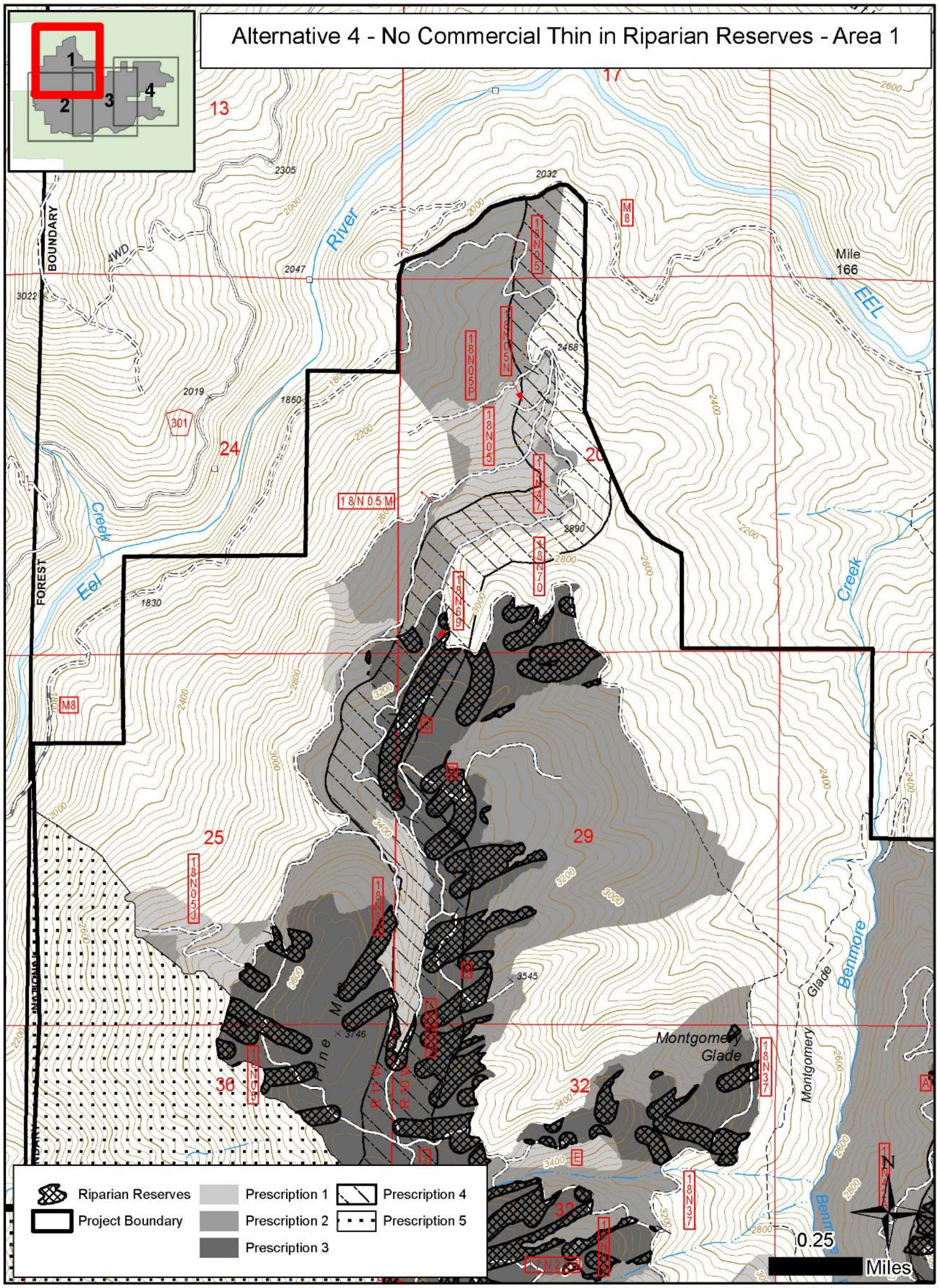
Alternative 4



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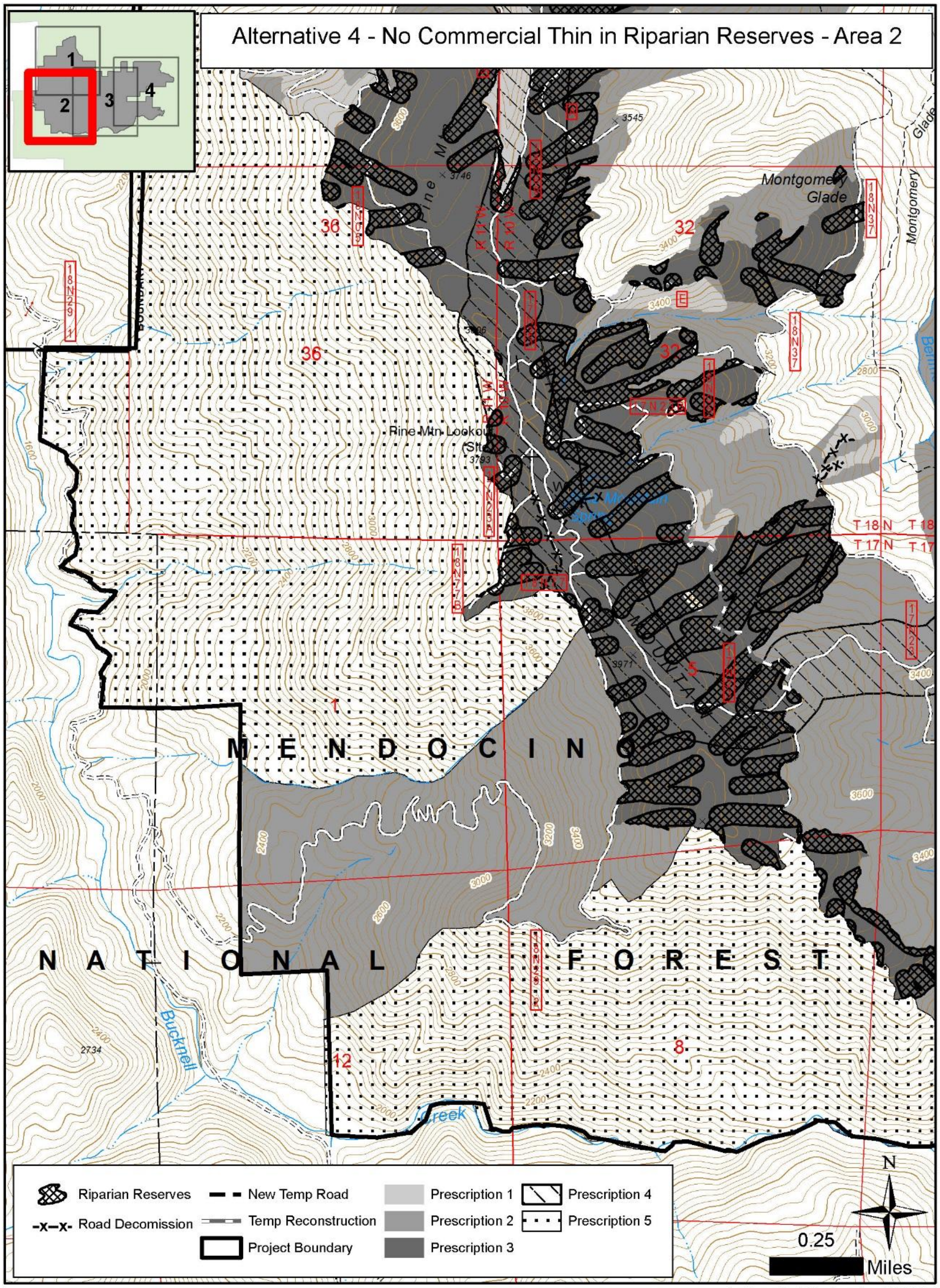
Alternative 4 - No Commercial Thin in Riparian Reserves - Area 2



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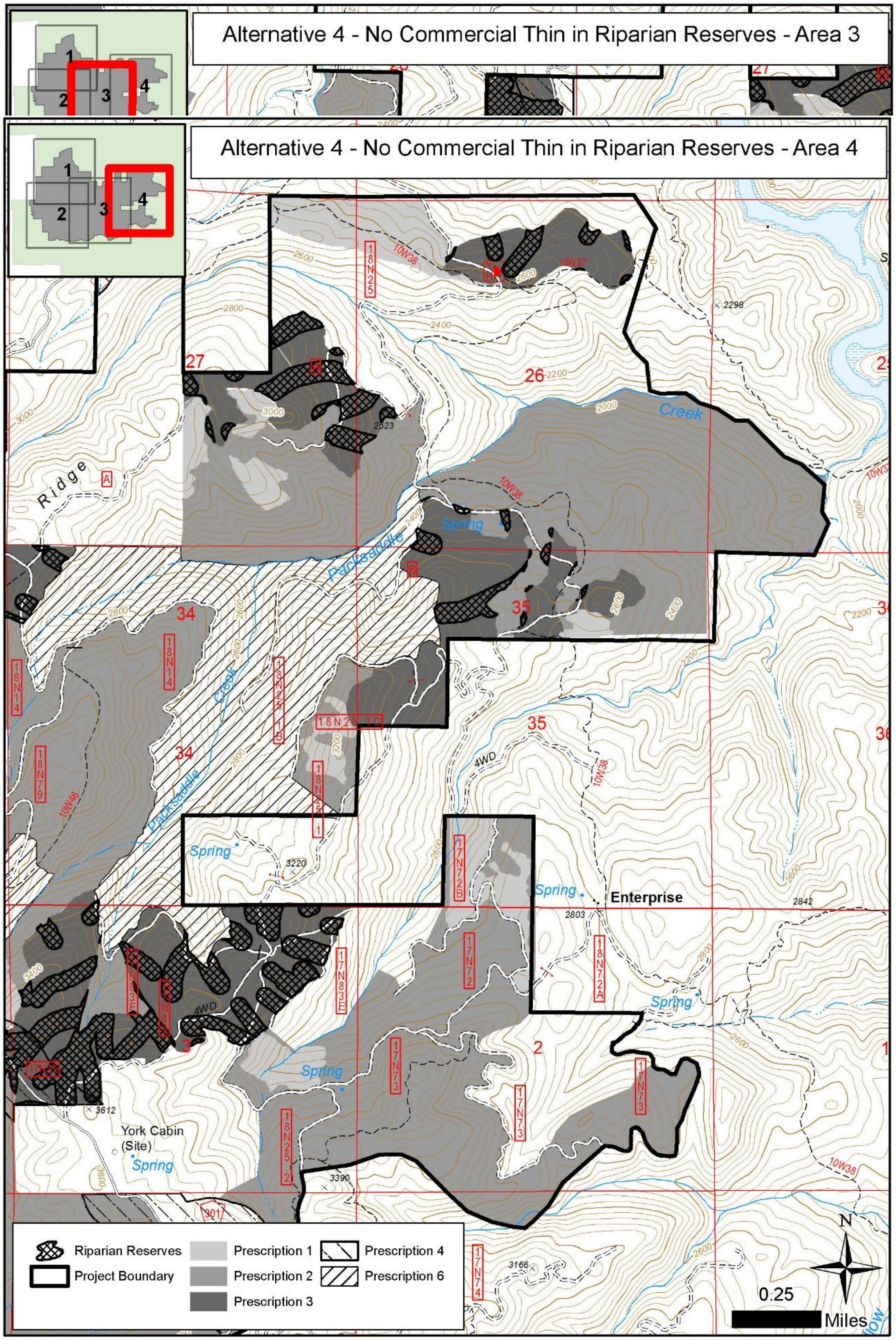

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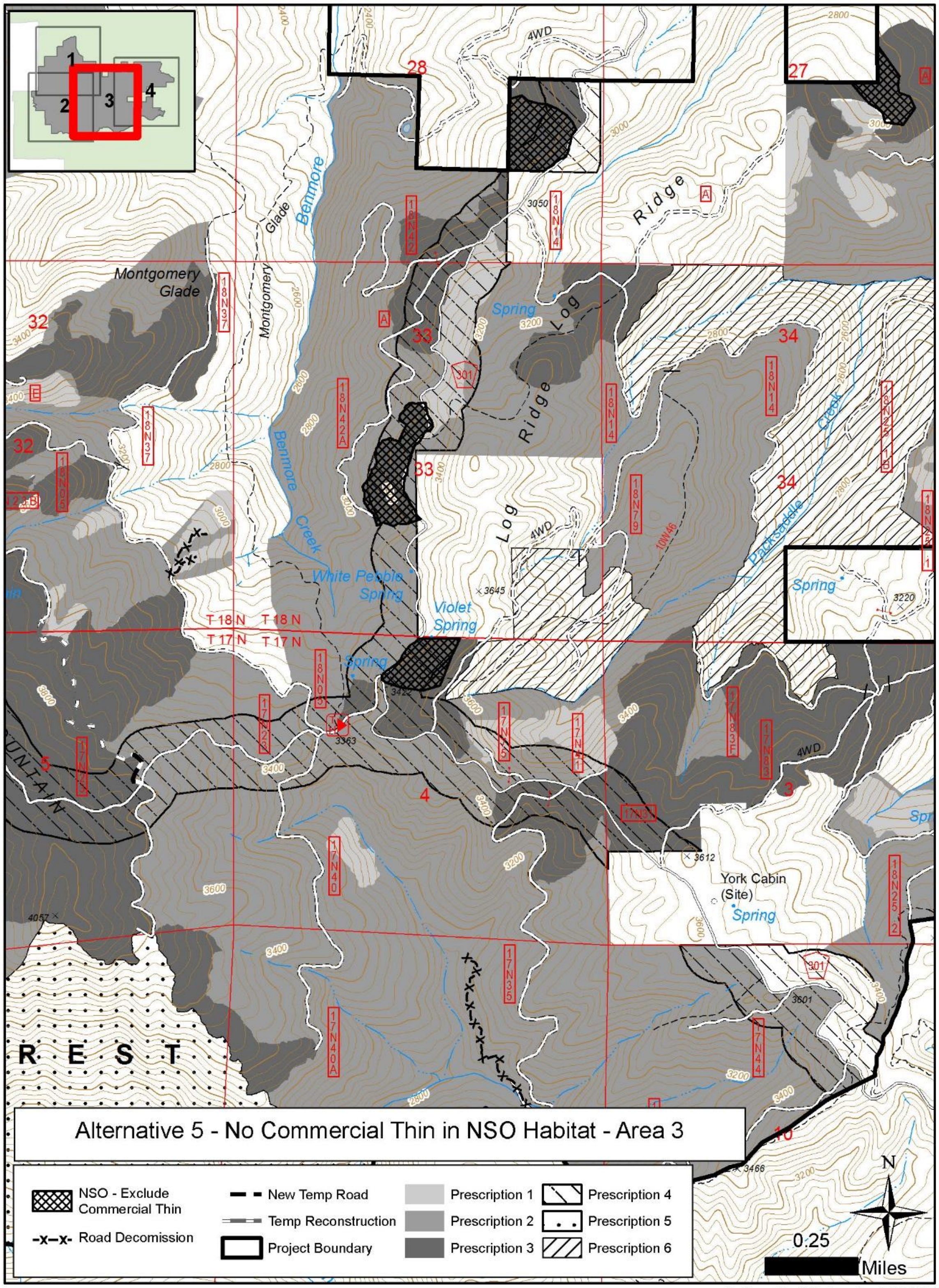
Alternative 5



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Appendix D- Consistency Checklist

#	FOREST-WIDE STANDARDS AND GUIDES	PROPOSED ACTION COMPLIES
Air Quality (pp IV - 17)		
1.	Manage National Forest activities to maintain air quality at a level which meets or exceeds State and/or local government regulations.	All prescribed burning is coordinated with and approved by Lake County Air Quality Management District to ensure that state and local air quality objectives are met.
2.	Conduct prescribed fire activity only on burn days unless variances are obtained from appropriate Air Pollution Control Boards..	All prescribed burning is coordinated with and approved by Lake County Air Quality Management District to ensure that state and local air quality objectives are met.
4.	Coordinate prescribed burning activities with affected groups and agencies.	All prescribed burning is coordinated with and approved by Lake County Air Quality Management District to ensure that state and local air quality objectives are met.
Diversity (pp IV – 17,18)		
	Maintain diversity of plant and animal communities and viable populations of wildlife, in part, through the application of the following standards and guidelines: a) ithin each major vegetation type, provide at least 5% of the Forest in each seral stage. These required acreages are allocated to each management area in the management area direction in proportion to the current vegetation types therein. These goals are not intended to force or create attributes which cannot or do not occur naturally in a given area. Seral stages: 1 = Grass/forb stage, with or without scattered shrubs and seedlings 2 = Shrub/seedling/sapling stage	a) The PA uses variable density thinning to create, sustain, or restore spatial, structural and compositional heterogeneity throughout the stand. Prescribed burning will be us to regenerate chaparral creating diversity in searl stages. b) The PA uses variable density thinning to create, sustain, or restore spatial, structural and compositional heterogeneity throughout the stand.

	3a = Pole/medium tree stage with canopy cover of 39% or less 3bc = Pole/medium tree stage with canopy cover of 40% or more 4a = Large tree stage (mature and over mature) with canopy cover of 39% or less 4bc = Large tree stage with canopy cover from 40% to 69% 4c+ = Overmature, large tree stage with tree canopy cover 70% or greater b) etermine the specific arrangement of vegetative types and seral stages (in terms of size, distribution, and location) within each management area, necessary to meet management indicator species needs, as defined in the wildlife habitat models. c) aintain at least 15% of Federal forested lands within fifth field watersheds (20-200 square miles) in late-successional forest. This includes forested lands in all land allocations within the water shed. Protection of these stands could be modified in the future, when other portions of the watershed have recovered to the point where they could replace the ecological roles of these stands (FEIS ROD p. C-44).	
3	Follow hardwood, snag, and coarse woody debris direction in the Wildlife section of these Forest-wide standards and guidelines.	The PA retains snags >20” DBH on the large end. Hardwoods are the priority leave tree species. In areas of hardwood retention the encroaching firs will be removed to reduce competition for nutrients and water and release the hardwoods.
Fire and Fuels (pp IV – 20-21)		
1.	Provide for protection from wildfire, through timely detection and suppression response with appropriate forces, such that cost plus net resource loss due to wildfire is minimized. All wildfires will be contained, confined, or controlled in accordance with specific management area direction.	Proposed action would create treatments, that after completion, is expected to reduce cost of wildland fire responses as well as reduce resources loss due to potential wildfires. After project completion, the project area will be in conditions that will allow for a more efficient and safer suppression response.

3.	Design fuel treatment and fire suppression strategies, practices, and activities to meet Aquatic Conservation Strategy objectives, and to minimize disturbance of riparian ground cover and vegetation...	No machine piling would occur in riparian reserves; Hand Piles (if created) would be located a minimum of 25 feet from the high water mark, unless on a topographic break (flat or bench with slope <20%). The small sizes and scattered arrangement of hand piles minimize disturbance to ground cover and vegetation.
8.	Treat fuels to reduce the potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.	The fuels reduction treatments in the Proposed Action will reduce fire intensity and after completion, is expected to reduce cost of wildland fire responses as well as reduce resources loss due to potential wildfires. After project completion, the project area will be in conditions that will allow for a more efficient and safer suppression response.
9.	Integrate multi-resource management objectives into fire hazard reduction efforts. Design prescribed fire projects and prescriptions to contribute to attainment of Aquatic Conservation Strategy objectives.	The fuels reduction treatments in the Proposed Action will assist in long-term maintenance and protection of the Riparian Reserves and will attain ACS objectives. Potential short term impacts are minimal due to design features and BMPs.
10.	Emphasize fuels treatment efforts for fire hazard reduction purposes in the following areas: a. atural Fuels:Continuous, mature brush stands of more then 150 acres adjacent to or within areas of urban interface, resource investments, or high fire hazards; b. ontinuous, mature brush stands more then 25 years old; c. ontinuous, mature brush stands with dead-to0live ratios greater than 35% d. orested areas with excessive accumulations of natural fuels Activity Fuels: a. In zones of urban interface of other high hazard areas;	Brush burning is proposed primarily in large continuous, mature brush fields on the western side of the project. The project would treat excessive accumulations of natural fuels.

	Where treatment is necessary before initiating other multi-resource management projects, e.g. reforestation	
12.	Consider the particular needs for the specific vegetative communities and sensitive plants where prescribed burning is used as a vegetation management tool (e.g. within the 'shrub hardwood" type). Vary or adjust the frequency, intensity, and timing of prescribed burning proposals as necessary to protect specific vegetation types, botanical diversity, and the viability of sensitive plant species.	The proposed action would use fire as a vegetation management tool for shrub and hardwoods. The purpose and need describes the existing and desired conditions of these vegetative communities.
Forest Health (pp IV – 22)		
1.	Utilize an integrated pest management (IPM) approach in the planning and implementation of all activities that influence vegetation. A full range of alternative treatments, including mechanical, cultural, biological, and chemical methods, will be considered on a project by project basis. Selection of the appropriate method(s) will be made through the environmental analysis proces after consideration of the probable environmental effects, efficiency of treatment, and the cost of feasible alternatives.	Integrated pest management techniques have been used to identify existing and potential pest problems that could impact the ecosystem. Integrated means that management strategies were developed by the interdisciplinary team members and region 5 Forest Health Protection program employees to avoid, identify, or solve a pest problem. Included specialist were botanist, entomologists, fish and wildlife biologist, hydrologists, pathologists and silviculturists. The Proposed Action was developed to include thinning treatments to reduce competition induced stress and potential pest attack. The presence of invasive species was assessed and evaluated mitigation and monitoring measures were developed Refer to the Botany and Silviculture Report for a more detailed discussion.
5.	Incorporate pest detection, surveillance, evaluation, prevention, suppression, and post action evaluation as integral components of the IPM approach. Determine needed monitoring and implementation plans during project planning.	Visual walk through inspections along with collection of data through common stand exams during project development served to detect the presence and potential for pest impacts. Analysis of stand exams data served in the evaluation and development of treatment prescriptions to provide for prevention or suppression of potential impacts. Post treatement evaluation will be an ongoin process as treated areas progress through different project phases Monitoring will primarily conducted by visual inspection. The PA has identified project implementation guideline to mitigate

		potential pest problem. Refer to the Silvicuture Report for a more detailed discussion.
Heritage Resources (pp IV – 22)		
1.	Emphasize a well-balanced heritage resources program at all levels. Develop management plans for heritage resources focusing on inventory, evaluation, protection, interpretation, public participation, education, and research in accordance with the National Historic Preservation Act of 1966 and other legislation.	All known or discovered resources have been documented and will be protected through Standard Resource Protection Measures as required by the Region 5 2013 Heritage Programmatic Agreement. The Pine Mountain PA proposes thinning of larger trees (10in+) around Pine Mountain Lookout in order to further protect this valuable national register eligible lookout. Thinning these trees will also supplement the <10in thinning that currently exists in the area of the lookout and further protect the resource.
2.	Complete a systematic program of inventory, evaluation, and management of heritage resources to protectand preserve significant heritage values.	The all areas of the APE that are planned to experience ground disturbing activities have been surveyed at the intensive level and all known or discovered resources have been documented and will be protected through standard resource protection measures as required by the Region 5 2013 Heritage Programmatic Agreement.
3.	Whenever heritage resources might be affected by an activity, protect the properties or resource sites until they are evaluated. Follow procedures for assessing and treating any effects, and maintain the integrity and values of eligible properties, to the extent possible, as outlined in the Advisory Council on Historic Preservation's regulations (36 CFR 800).	All heritage surveys within the project APE meet the requirements of the Region 5 2013 Heritage Programmatic Agreement and have been conducted at the intence level. All identified heritage resources will be protected using approved protection measures (flag and avoid).
TES Plants (pp IV – 34-35)		
1.	Manage sensitive plants to ensure that species do not become threatened or endangered because of Forest Service action.	There are no Forest Service Sensitive plants or fungi within or near the proposed project area. Potential habitat for wetland and riparian plants is excluded from all treatments except for understory broadcast burning. Low-to-moderate intensity fire helps maintain beneficial habitat conditions for riparian and wetland species on the Mendocino National Forest.

6.	Survey and Manage, within all land allocations, for some species of bryophytes, vascular plants, fungi, and lichens.	
	a) Manage known sites of species in categories A, B, C, D, and E.	There is one known site within the project boundary. Galerina heterocystis, a category E fungus, occurs close to Benmore Creek. The area is outside any treatment units and will be adequately buffered to prevent any habitat degradation.
	b) Conduct surveys, within known ranges, for Category A, B, and C species prior to habitat-disturbing activities.	Pre-disturbance surveys for *Cypripedium fasciculatum* and *C. montanum* were conducted in 2008 and 2014; no plants were found. Surveys for *Botrychium* species and *Ophioglossum pusillum* were not conducted because potentially suitable habitat will not be impacted by habitat-disturbing activities. There is no suitable habitat(old-growth) for Category C species within any of the treatment units.
7.	Minimize intensive burning, unless appropriate for certain specific habitats, communities or stand conditions. Plan prescribed fires to minimize the consumption of litter and coarse woody debris. Minimize soi and litter disturbance resulting from yarding and operating heavy equipment. Reduce the intensity and frequency of site treatments.	Prescribed burning will be mostly limited to low-to-moderate intensity fire, possibly with the exception to brush units. Best Management Practices have been identified and an Erosion Control Plan has been created to ensure minimal soil and litter disturbance from heavy equipment. Ground cover standards have been established (see Appendix B- Design Features). These information can also be found in appendix B and C of the Hydrology Report.
Timber & Other Forest Products (pp IV – 35-39)		
1 c)	Prohibit timber harvest, including fuelwood cutting, in riparian reserves, except as described below. Apply silvicultural practices for riparian reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain aquatic conservation strategy objectives.	As described in the Silvicultural Report, the majority of Riparian Reserve's vegetative composition and density is indistinguishable from upland areas. As such, they are also susceptible to severe fire damage in the event of a wildfire. The thinning proposed will reduce the probability of severe damage which meets the ACS objectives to "maintain and restore" (FSEIS ROD p. B-11).
2.	Use directional felling to protect streambanks	Refer to design features treatment prescription 8 Riparian Reserve

		Management. (PA items 18.1 and 18.2)Trees within the riparian reserve will be directionally felled in a manner to prevent impacts to stream banks. Vegetation that is designated for treatment within the SMZ would either be removed in the thinning operation or hand piled for burning.
3.	Maintain at least 15%of federal forest lands within fifth field watersheds (20-200square miles) in late-successional forest. This includes forested lands in all land allocations within the watershed. (FSEIS ROD p C-44)	The Proposed Action would not reduce the amount of late successional forest, or components thereof, in any of the 5th field watersheds (see Wildlife and Silviculture reports).
4a	Selection and application of silvicultural systems for lands managed for sustained timber yields (suitable timber lands) will be that system which best meets long-term resource management objectives for the area. Silvicultural objectives for matrix land should include: (1) production of commercial yields of wood, (2) retention of moderate levels of ecologically valuable old growth components such as snags, logs, and relatively large green trees, and (3) increasing ecological diversity by providing early successional habitat. When determining harvest prescriptions within the even aged silvicultural system, emphasize green tree retention, thinning, or shelterwood prescriptions to provide a genetic legacy that bridges past and future forests.	This Standard and Guide applies to matrix land and is driven by the purpose and need for a particular project. For example, the Projects matrix land area will provide commercial wood (objective 1) while increasing matrix area forest health and resiliency to reduce the risk of stand replacing fires. The treatment provides for retention of moderate levels of ecologically valuable old growth components such as snags, logs, and relatively large green trees (objective 2).No need has been identified for increasing early successional habitat (objective 3). In fact, recent fires (e.g. the Back Fire) in the project area and circa 1980's timber operations have provided for early successional habitat. This would help to ensure that future wood products will be available and that included matrix stands can consist of mature to late-seral and old growth stages providing a genetic legacy that bridges past and future forests.
4b	Base silvicultural prescriptions on the results of an environmental analysis performed by an interdisciplinary team, and a thorough evaluation of stand conditions. All prescriptions shall be signed by a certified silviculturist.	The prescriptions, as comprised by the marking guides were developed integral to the interdisciplinary environmental analysis process. The prescriptions have been reviewed and signed by a Certified Silviculturist. Refer to the Silviculture Report.
4c	Base silvicultural prescriptions for special areas on the management emphasis designated for that area (e.g. providing wildlife habitat or protecting visual resources).	The prescriptions, as comprised by the marking guides, were developed directly in association with guidlines associated with each management areas, and are based on the management emphasis designated for that area.

4d	Base silvicultural prescriptions on the results of an environmental analysis performed by an interdisciplinary team, and a thorough evaluation of stand conditions. All prescriptions shall be signed by a certified silviculturist.	The prescriptions, as comprised by the marking guides were developed integral to the interdisciplinary environmental analysis process. The prescriptions have been reviewed and signed by a Certified Silviculturist.
7a	Release conifers when necessary to free them from competing vegetation. Utilize a variety of methods including…,hand or mechanical cutting,…	The proposed action includes hand and mechanical release treatments to control plant growth that is competing with hardwood and conifer species.
7b	Consider all types of release and base selection of the particular treatment method on site specific analysis…..	The proposed release treatments were developed by an interdisciplinary team based on site and environmental protection criteria.
7c	Restrict hand release to slopes less than 60%,unless a hazard analysis indicates it is safe to do so.	The proposed release treatments were developed by an interdisciplinary team based on site and environmental protection analysis. Job Hazard Anlysis (JHA) cover personel safety.
8a	Utilize precommercial thinning where they will decrease the time to the first commercial thinning cut, or to a final harvest cut, or protect plantations and natural stands form insect or disease attack, or to decrease the time to achieve late seral stage conditions where desired. Balance cost effectiveness with multiple use goals.	Treatment prescription 1 ands 2 have been designed to enhance and protect both LSR and Matrix land alocations. Review Silviculture and Fuels Reports.
8b	Select leave trees that are free from dwarf mistletoe whenever possible. In stands heavily infected with dwarf mistletoe, select leave trees that have the lowest Hawksworth mistletoe ratings and non-host species, including hardwoods.	Refer to the Silvicultural Report for a discussion concerning marking guideline requirement for dwarf mistletoe.
8c	Precommercial thinning will be conducted in such a manner as to leave standing trees in riparian areas as a source of litter for soil cover, and to help maintain bank stability. Trees which are felled, will not be deposited in stream channels They may be left on the streambank to reduce erosion, but not in such concentrations that create an unacceptable fire hazard.	Prescriptions for precommercial thinning in the proposed action would be the same within and outside Riparian Reserves but will result in live standing trees within Riparian Areas. Project design features prevent the removal of any trees that are contributing to bank stability. (Refer to Treatment Prescription 1 and 2)
9a	Utilize commercial thinning where they are necessary to achieve stocking control and to increase the total yields of useful material from a stand when it can be shown to be economical or where necessary for forest health.	Commercial thinning is primarily being used because it is necessary for forest health, wildlife habitat enhancement and fuels reduction. Some increase in total yields within the matrix land allocation will occur as a result of thinning: as well as, accelerated

		late successional habitat development. (Refer to the Silviculture Report)
11a.	Generally confine tractor logging to sustained slopes of less than 35 percent. When possible, limit skid trails to 15 percent of the harvest area and tractor slash piling to the dry season.	Tractor units have sustained slopes less than 35%. Project specifications limit skid trails to 15% of tractor harvested areas; BMPs limit heavy equipment operation when soil moisture is too high (Appendix B)
Visual Resources (pp IV – 39-40)		
1.	Manage areas to provide the viewing public with characteristic natural appearing landscapes in accordance with the visual quality objectives specified in this Plan and as depicted on the included Visual Quality Objectives Map.	The Visual Quality Objectives Map was reviewed. (Refer to the Silviculture Report.)
1.c.1).	Partial Retention VQO - Foreground Distance Zone: Manage vegetation for a diversity of species common to the area, with a range of ages and size classes up to and including mature timber. Normally timber harvest openings will be limited to five acres. Even-aged, unevenaged, and special cutting may be applied. Impacts of management activities in highly visible foreground areas wil be reduced through special treatments, as mentioned above in the discussion for the Retention VQO.	The proposed thinning treatment prescription will meet this objective. No openings are proposed. Residual vegetation and slash disposal will reduce the visibility of management activities. (Refer to the Silviculture Report.)
1.c.2)	Partial Retention VQO - Middleground Zones -Manage vegetation with a range of ages and size classes. In addition to visually sensitive areas, this VQO applies to LSRs,…. Other management and resource constraints on these areas will be more restrictive, and management for a Partial Retention VQO should not hinder management of these areas.	The proposed thinning treatment prescription will meet this objective. A range of age classes will continue to be present. Residual vegetation and slash disposal will reduce the visibility of management activities. (Refer to the Silviculture Report.)
1.d.1)	ModificationVQO - Foreground Distance Zone -Manage vegetation with a range of ages and including small timber (size class 3).Normally, timber harvest openings will be limited to 20 acres.	The proposed thinning treatment prescription will meet this objective. No openings are proposed. Residual vegetation and slash disposal will reduce the visibility of management activities. (Refer to the Silviculture Report.)
1.d.2)	Modification VQO - Middleground and Background Distance Zones: The even-aged silvicultural system will be applied.	Even aged management within the plantation units comply with this objective. However, since a large portion of the modification area is within the LSR boundary, other management and resource constraints on these areas will be more restrictive, and management will focus on Partial Retention VQO applying

		modification only to plantation treatment units.
Wildlife (pp IV – 42-48)		
1.	Manage sensitive animal species to ensure that they do not become threatened or endangered because of Forest Service action.	The Proposed Action will not remove habitat for Forest Service sensitive species that would cause a trend towards listing under the Endangered Species Act. The PA is designed for wildlife enhancement and protection by increasing forest health and resiliency. The PA benefits sensitive species in the long-term by protecting and enhancing their habitat.
2.	Provide for viable populations of Management Indicator Species by maintaining moderate to high habitat capability, as described by the habitat capability models found in Appendix E of the Forest Plan. These models will be reviewed as needed to incorporate the most current information on habitat needs of fish and wildlife species. Management activities will comply with species recovery plans (threatened and endangered species) and habitat management plans, as they apply to the Mendocino National Forest.	The PA takes into consideration MIS and their habitat needs as found in the HCM in Appendix E of the LRMP. Snag and CWD guidelines mitigate those features lost to prescribed fire and create sufficient dead and down where it is lacking on the landscape. The actions in TE species habitats will comply with the recovery plans by maintaining the recommended canopy cover and basal area to provide habitat for nesting, roosting, and foraging. Northern spotted owl is the only TE species in the project areas.
3.	Peregrine Falcon – a) Establish a one mile radius primary management zone around peregrine falcon nest sites. Direct activities within this zone towards promoting high habitat capability for peregrines as described by the habitat capability model (HCM) in Appendix E. Evaluate each site on a case-by-case basis for specific mitigation measures needed. b) Strive to meet the Regional habitat and population goals for peregrine falcons. This goal is currently three nesting pairs on the Mendocino. Based upon occupancy and reproductive records for California, this will require maintaining habitat capability at 6 sites. In order to accomplish this goal it will be necessary to manage for and survey potential sites, as well as monitor known existing sites. Map, record, and protect from adverse management and human disturbance, all known or newly discovered nesting territories, in	a) There are no known nest sites or suitable nesting structures for the Peregrine Falcon within the project area. b) There are no known nest sites or suitable nesting structures for the Peregrine Falcon within the project area.

	accordance with guidelines found in the Pacific States Recovery/ Plan for the American Peregrine Falcon (1982). Develop site specific management plans for each active eyrie.	
4.	Bald Eagle **a)** Establish primary and secondary management zones around bald eagle nest sites. The primary management zone is defined as an area around the nest site where human disturbance will be minimized with special consideration given to maintaining a suitable nest site in perpetuity. The secondary management zone serves as a buffer and includes regularly used foraging and roosting areas. These tones will be determined on a site specific basis. Manage the habitat within these zones to provide for high habitat capability as described in the HCM in Appendix E. **b)** Develop site-specific management plans for all occupied nest territories. Specify public closures as needed around identified roost sites in the Plans. **c)** Meet population goals and follow guidelines for habitat and species management outlined in the Pacific States Bald Eagle Recovery Plan. The Forest goal is three nesting pairs and one wintering area. Survey potential sites and take action to encourage use of suitable areas, and improve habitat where needed.	a) The are no known bald eagle nests within the project area. The nearest nests are near Lake Pillsbury. Bald eagles may be seen foraging in the project area but the PA should not affect their ability to forage. Snags will be retained or created by prescribed fire that bald eagles may use for resting. Appropriate LOPs will be placed around nests if their territories overlap with actions (Jan 1 – July 31). b) Out of scope of the project. c) There is not suitable nesting within the project area and Lake Pillsbury is the closest large bodies of water where eagles may nest along the shoreline. Eagles may forage within the project area. The snag retention in the PA that will benefit the eagles as perches while foraging or traveling.
5.	Osprey- Minimize disturbing activities between March 1 and August 15, within approximately 600 feet of any active osprey nests that are found.	There are no known osprey nests within the project area.
6.	Goshawk- Maintain viable populations of goshawks by providing suitable nesting and foraging habitat within the matrix, in addition to habitat located within other land allocations, such as LSRs.. Implementation of these guidelines should be integrated into landscape level planning, rather than approached as single species protection. a) Establish a primary nest zone of a ½ mile radius circle (504 acres) around the last known nest or the geometric center of a cluster of all	There are no known active northern goshawk nests within the project area. Should an active nest be discovered during the life of the project, management actions will be modified to comply with Forest Plan direction. There are no known active northern goshawk nests within the project area. Should an active territory be discovered during the life of the project, management actions will be modified to comply with direction from the LRMP.

	known nests. Within this circle, maintain 60% (300 acres) in dense mature forest cover (>60%CC, >24"dbh [4B,C+l). The existing nest stand should be used to determine desired forest structure. This 300 acres should include the active and historic nest stands and be as contiguous as possible relative to existing conditions. The remaining 40% should be managed for a habitat mosaic dominated by large trees and open understories (3N,G - 4P,N,G+), but lower canopy closure (40-60%) and small openings are allowable. b) Establish a foraging habitat zone of a 1.0 mile radius circle centered on the primary nest zone. The foraging habitat zone is the 1506 acres outside of the primary nest zone. Maintain 60% (900 acres) in a mosaic of mid-mature (3N,G+) to late successional forest condition. Desired conditions include open understories, large coarse woody debris, large snags, small openings. The remaining 4096 can be younger stands and small openings. c) Restrict habitat modifying activities between March 1st and August 31 within primary nest zones. Restrict loud and/or continuous noise within 1/4 mile of active nest sites during the same time period. Permit normal levels of vehicle traffic on existing roads in cases where goshawks appear to be habituated to such activities. Determine the actual distance and timing based on the physical and biological features of each site and the nesting chronology of individual birds. d) Within LSRs and other reserved lands, complete an inventory of the identified nest sites to determine occupancy and nesting status. Inventory of other areas will be completed as a part of project planning. e) Encourage the use of underburning, fuels reduction, and thinning to	There are no known active nests for the northern gohawks within the project area. Appropriate LOPs and restrictions will be placed around any territories discovered during the life of the project. d) There are no known active nest areas to be monitored within the project area. Surveys for northern goshawks will not be conducted consecutively with northern spotted owl surveys since goshawks could act predatorily to owls. Any goshawk sightings that occur during NSO surveys will be recorded. If observed goshawks exhibit territorial behavior than the observation will be further investigated. e) The PA utilizes underburning, fuels reduction, and thinning to enhance and protect the habitat within the project area.

	achieve desired habitat conditions within the primary nest and foraging habitat zones.	
7.	Northern Spotted Owl - Assure that viable populations of northern spotted owls are maintained through implementation of the land allocations and standards and guidelines in this Land and Resource Management Plan, which fully incorporates all applicable land allocations and standards and guidelines published in the Record of Decision and Final Supplemental Environmental Impact Statement for Management of Habtat for LateSuccessional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl, April, 1994. a) Within Mapped LateSuccessional Reserves (LSRs): 1) Implement the standards and guidelines specified in Management prescription Rx 6 Late-Successional Reserves and the additional direction provided for Management Areas 16 through 21. 2) Conduct necessary inventory and monitoring activities to determine population densities and habitat trends within each area 3) Review proposals to remove individual or small groups of trees for administrative needs (e g. hazard trees) or other resource management activities (e.g. campground expansion) on a case by case basis. Utilize the standardized hazard tree definitions. 4) Update mapped LSRs as new LSRs resulting from designating 100 acres around known spotted owl activity centers (as of January 1, 1994). Follow LSR standards and guidelines within the new LSRs. b) Within the Matrix 1) Locate and map 100 acres of the best, nearest habitat around known spotted owl activity centers (as of January 1. 1994) prior to any ground disturbing activities. Once located, follow LSR standards and guidelines. (FSEIS ROD p. C45) 2) Manage stands surrounding the 100 acre activity centers to reduce risks of natural disturbance (FSEIS ROD p. C-45)	a) The PA uses RX 6 – Late-Successional Reserves as well as the management direction from Management Area 21 – Pine Mountain. For this project emphasis is on protecting and enhancing late-successional and old growth habitat for the longevity of the habitat and for the species that use the habitat, like northern spotted owls. There are also treatments focusing on plantations to protect future habitat for spotted owls and goshawks. Northern spotted owl surveys are being conducted to the 2011 survey protocol in 2016 and 2017. b) Any NSO activity centers found within Matrix lands will be considered for 100-acre LSR designation. The management actions taken within the project area will reduce the risk of natural disturbance on Matrix lands and will provide protection for 100-acre LSRs. The appropriate LOP will be placed around historic activity centers and any new NSO nests found during surveys.

	3) Maintain direction for management of lands reserved from timber production (eg Backcountry areas, RNAs, Wild and Scenic Rivers), or other lands classified as unsuitable for timber production, which would affect the suitability of such lands for northern spotted owl habitat. Changes in direction for administratively withdrawn areas require LRMP amendments. Amendments that propose to significantly reduce protection for late successional or old growth forest related species, or reduce protection for aquatic ecosystems, are subject to review by the Regional Ecosystem Office to determine ifthe objectives of the standards and guidelines published in the ROD for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl, would be significantly adversely affected (FSEIS ROD p C-29) 4) Exclude management activities within approximately a *1/2* mile radius of active nest sites from February 1 through July 31. Determine the actual distance and timing based on the physical and biological features of each site and the nesting chronology of individual birds.	
8.	Fringed Myotis, Silver-haired Bats, Long-eared Myotis, Long-legged Myotis, and Pallid Bats - a) Within the Matrix: 1) Conduct surveys of crevices in caves, mines, and abandoned wooden bridges and buildings for the presence of roosting bats. Caves are defined in the Federal Cave Resources Protection Act of 1988 as 'any naturally occurring void, cavity, recess, or system of interconnected passages which occur beneath the surface of the earth or within a cliff or ledge (… but not including any…man-made excavation) and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or man-made.' Searches should be conducted during the day in the summer to locate day roosts and maternity colonies; at night during the late summer and fall to locate night roosts, which are important for reproduction; and during the day in the winter to locate hibernacula. If bats are found, identify the species and determine for what purpose the site is being used by bats. (FSEIS ROD p. C-43)	a) There are no suitable roosting structures for bats within the project area. b) There are no suitable caves for bats within the project area.

	2) Prohibit timber harvest within 250 feet of sites containing bats as an interim measure. Develop standards and guidelines and/or mitigation measures in project or activity plans for the site, following an inventory and mapping of resources, the purpose of the standards and guidelines is to protect the site from destruction, vandalism, disturbance from road construction or blasting, or any other activity that could change cave or mine temperatures or drainage patterns. The size of the buffer, and types of activities allowed within the buffer, may be modified through the standards developed for the specific site. Retain abandoned bridges or buildings contingent on safety concerns. (FSEIS ROD p. C-43) b) WIthin Other Land Allocations: 1) Protect known occupied caves from destruction, vandalism, disturbance from road construction or blasting, or any other activity that could change cave or mine temperatures or drainage patterns. (FSEIS ROD p. C43)	
9.	Red-legged Frog -Within all Land Allocations 1) Follow the aquatic conservation strategy. 2) Follow final implementation strategies developed following a final FWS recovery plan, if the red-legged frog is listed as an endangered species.	There are no red-legged frogs within the project area.
10	Mollusks and Arthropods - Within all Land Allocations: 1) Manage known sites of species listed under categoty 1 in table 4-5. Acquire information on these known sites, and make this information available to project planners. Use this information in the design or modification of activities. In most cases, the appropriate action will be to protect relatively small sites on the order of tens of acres. (FSEIS ROD p. C-4) 2) Conduct surveys, within the known range, for species listed under category 2 in table 4-5, prior to ground disturbing activities implemented in fiscal year 1999 and beyond. These surveys may be conducted at a scale most appropriate to the species, and, for most species, the surveys would start at the watershed analysis level with	There are no known mullosk or arthropod sites within the project area.

	identification of likely species locations based on habitat. Likely locations would then be thoroughly searched prior to implementation of activities. For some species, the identification of likely sites may be most appropriately done at the scale of individual projects. Design surveys for maximum efficiency, and utilize multispecies surveys where they would be most efficient. Design surveys to minimize the number of site visits needed to acquire credible information. (FSEIS ROD p. C-5) 3) Establish managed sites and standards and guidelines for species located during surveys described above. (FSEIS ROD p. C-5) 4) Participate in general regional surveys for species in category 4 listed in table 4-5, designed to acquire addltional information and to determine necessary levels of protection. These surveys will be initiated no later than fiscal year 1996 and will be completed within 10 years. (FSEIS ROD p. C-6) 5) Minimize intensive burning, unless appropriate for certain specific habitats, communities or stand conditions. Plan prescribed fires to minimize the consumption of litter and coarse woody debris. Minimize soil and litter disturbance resulting from yarding and operating heavy equipment. Reduce the intensity and frequency of site treatments. Soil compaction, and removal or disturbance of humus layers and coarse woody debris may impact populations of arthropods and other lmer dwelling organisms. (FSEIS ROD p. C-44)	
11.	Snag Management Within the Matrix **a)** Retain, as a minimum, a level of snags sufficient to support species of cavity nesting birds (with the exception detailed at b) below) at 40 percent of potential population levels based on published guidelines and models. Meet the 40 percent minimum standard throughout the matrix, with per acre requirements met on average areas no larger than 40 acres. To the extent possible, snag management within harvest units should occur within the areas of green tree retention. The needs of bats should also be considered in these standards and	a) Snags 20” DBH or greater are retained unless they pose a threat to human safety. Within the Back Fire footprint, retain a minimum of four snags >20” DBH, unless deemed a safety hazard. If there are less than four snags per acre >20” DBH then retain the four largest snags available. One snag per acre should be retained within the fuel break. Snags that are felled will be left on site for CWD where CWD is lacking.

	guidelines as those needs become better known. Snag recruitment trees left to meet an identified, near-term (less than 3 decades) snag deficit do not count toward green tree retention requirements. (FSEIS ROD p C-42) **b)** Maintain adequate numbers of large snags and green tree replacements for future snags within white-headed woodpecker, pygmy nuthatch, and flammulated owl ranges and in appropriate forest types. To accomplish this, no snags over 20 inches dbh within these species' range and within appropriate forest types will be marked for cutting, unless they meet the standardized hazard tree definitions. In addition, provide sufficient numbers of green trees to provide for the full (100 percent) population level, in the longer term, of white-headed woodpeckers, pygmy nuthatches, and flammulated owls. The snag requirements for these species must be added to snag requirements for other species of cavity nesting birds. Site specific analysis and application of a snag recruitment model, taking into account tree species, diameters, falling rates, and decay rates, will be required to determine appropriate tree and snag species mixes and densities. (FSEIS ROD p. C-45-47) **c)** Provide sufficient recruitment trees (culls or live green trees) to ensure snag densities do not decrease below minimum levels over time. **d)** Develop standardized definitions of hazard trees to guide hazard tree marking during harvesting, road and recreation site maintenance, or other activities (FSEIS ROD p. C-46)	b) The PA does not remove snags >20" DBH. c) There will be snag recruitment trees left on the landscape. Prescribed fire may also create snags. d) Hazard tree guidelines have been developed for the Pacific Southwest Region.
12.	Coarse Woody Debris – a) Develop and use models for groups of plant associations and stand types that can be used as a baseline for developing prescriptions providing for a renewable supply of large down logs, well distributed across the matrix landscape in a manner that meets the needs of species and provides for ecological functions. (FSEIS ROD p. C-40)	CWD >20" or the largest available will be retained where it exists up to a total of 5-10 tons/acre. Where CWD is lacking trees or snags that are felled will be left on the ground.

	b) Until such models are available, maintain a minimum of three recently-downed logs per acre, averaged over 40 acres. Logs will be greater than 20 inches in diameter (large end). Logs will be greater than ten feet in length, with one log per acre greater than 20 feet in length. Log densities in excess of 400 logs/40 acres will not contribute to meeting this requirement. c) Retain coarse woody debris already on the ground and protect to the greatest extent possible from disturbance during treatment (eg slash burning and yarding) which might otherwise destroy the integrity of the substrate. (FSEIS ROD p. C-40). d) Leave down logs within forest patches that are retained under green tree retention guidelines in order to provide the microclimate that is appropriate for organisms that use this substrate. (FSEIS ROD p. C41). e) Refine standards and guidelines for specific geographic areas through planning based on watershed analysis and adaptive management. (FSEIS ROD p. C-41).	
13.	Hardwood Retention – a) Retain a minimum of five square feet of basal area per acre in hardwood trees 12 inches in diameter or larger, averaged over 40 acres within each compartment. Retain at least one sound tree/acre greater than 20 inches in diameter. Where current hardwood stocking is insufficient to meet these requirements, retain and manage a sufficient number of hardwoods less than 12 inches in diameter to provide five square feet of total hardwood basal area when the smaller hardwoods reach 12 inches in diameter, while allowing for anticipated mortality. Species selected for retention will be representative of species present on site prior to treatment. b) Within identified key summer and winter ranges and migration corridors, retain the following levels of hardwoods, averaged over 40 acres within each compartment: **i)** Mixed Conifer - 15 square feet of basal area per acre in hardwood trees 12 inches in diameter or larger If less than 15	a) Treatments focus on late successional habitat and healthy hardwood stands promoting black oak and madrone. b) There is no key winter or summer ranges or migration corridors within the project area.

	square feet currently exists, the existing level may be reduced by no more than 75%. Retain at least one sound tree/acre greater than 20 inches in diameter. Where current hardwood stocking is insufficient to meet these requirements, retain and manage a sufficient number of hardwoods less than 12 inches in diameter to provide 15 square feet of total hardwood basal area when the smaller hardwoods reach 12 inches in diameter, while allowing for anticipated mortality. Species selected for retention will be representative of species present on site prior to treatment. **ii)** Conifer Hardwood - 35 square feet of basal area per acre in hardwood trees 12 inches in diameter or larger. If less than 35 square feet currently exists, the existing level may be reduced by no more than 75% Retain at least one sound tree/acre greater than 20 inches in diameter. Where current hardwood stocking is insufficiant to meet these requirements, retain and manage a sufficient number of hardwoods less than 12 inches in diameter to provide 35 square feet of total hardwood basal area when the smaller hardwoods reach 12 inches in diameter, while allowing for anticipated mortality. Species selected for retention will be representative of species present on site prior to treatment.	
14.	Determine the need to provide higher levels of hardwood retention on a case by case basis. The basal area in hardwoods may exceed the minimums specified in Standards and Guideline 12, where a site specific analysis has been documented, and has determined the need exists in order to provide for the viability of hardwood dependent species.	Areas that meet the description of needing hardwood release will receive a treatment to remove encroaching conifer trees on existing hardwood groups. This treatment will release hardwoods from competition and promotes growth.
15.	Coordinate other resource management (e.g. timber harvest, road construction, recreation, etc.) activities to minimize human disturbance in key wildlife areas such as deer fawning and wintering areas, goshawk nest sites, and peregrine falcon eyries.	The wildlife biologist has been an active member of the IDT coordinating wildlife desired conditions and ways to mitigate impacts on wildlife caused by project disturbance.
16.	Implement cooperative USFS/CDFG deer herd plans after review for	The PA will protect and enhance habitat for several species of

	conformance with Forest Plan direction. Coordinate any needed changes in these plans with the CDF&G. Establish habitat manipulation priorities based on habitat objectives and most limiting habitat variables identified in the deer herd plans.	wildlife including deer.
17.	Cooperate with Federal, State, and local agencies in improving wildlife habitat for all species. **a)** Coordinate with California Department of Fish and Game, U S. Fish and Wildlife Service, and other concerned agencies in the preparation and implementation of Federal and State Endangered Species recovery plans, the California Fish and Wildlife Management Plan (Sikes Act Plan), and species habitat plans **b)** Permit scientific investigations, monitoring, and artificial propagation as needed to reach population recovery levels for threatened and endangered species (see Glossary in DEIS).	a) The wildlife biologist has been in contact with USFWS about the project and the effects on TE species. Other agencies will be able to comment on the DEIS. b) Inventory and monitoring will being in spring of 2016 for TE species.
18.	Require that new and reconstructed powerlines meet current raptor safety protection standards.	The PA does not propose constructing powerlines.
Fish S&G – Mendocino NF LRMP – Sec. IV pg. 48-49		
20.	Provide medium to high quality habitat for resident trout and anadromous fish species, as defined by the habitat capability models including the following concerns: • Maintain high water quality values in accordance with the standards and guidelines for watershed. • Retain streamside vegetation along perennial streams so that at least 60% of the stream surface is shaded between 11 a.m. and 4 p.m. from June 1 to September 30. • On intermittent tributaries, provide a favorable habitat for bottom flora and fauna communities that are sources for fish forage and contributors of cool water flows to main streams.	No activities are proposed to take place in or near stream channels and SMZ and Riparian Reserve buffers will be in place; therefore, there should be no change in the habitat quality or quantity in the Pine Mountain project area. The current water quality should remain the same as it is pre-project and should remain within the parameters listed in the LRMP, Watershed S&Gs. No vegetation treatments are proposed in the SMZ so the current canopy closure should be maintained and there should be no reduction in the stream surface shade. The SMZs and Riparian Reserve buffers should retain the current quality of riparian habitat in intermittent streams with no reduction in quality or quantity of flora and fauna communities

		in intermittent streams in the project area.
27.	Avoid and discourage activities that would disturb summer steelhead during periods of critical low flow or high water temperatures.	No activities are proposed to take place in or near stream channels and SMZ and Riparian Reserve buffers will be in place; therefore, no direct effects can occur to steelhead from the implementation of this project. The current wildlife "Limited Operating Period" (LOP) should further reduce the risk of direct effects to steelhead during times of critical low flow or high water temperatures.
Soils and Geology (Page IV – 33)		
1.	Develop specific soil evaluation and mitigation measures for each project that has the potential to impact soil resources.	Design features for the protection of soil resources have been included in the proposed action.
2.	Identify and evaluate areas of known or suspected instability as a part of project planning. Protect areas with a high probability of mass wasting from ground disturbing activities.	A review of resource aerial photography and the Forest Service GIS geomorphology layer for unstable lands within the project area was completed as a part of the project planning. Additionally, unstable riparian reserves such as inner gorges and active landslides were field mapped and evaluated (Geology Report, Methods). Unstable riparian reserves would be protected from ground disturbing activities as required by the LRMP (See Geology Mitigation Measures in Appendix A).
3.	Protect long-term soil productivity in controlled burn prescriptions through the use of Mendocino National Forest Guidelines for Prescribed Burning of Chamise/Chaparral" and by meeting aquatic conservation strategy objectives.	Long-term soil productivity will be protected, since prescribed burns will be of low-to-moderate intensity. Prescribed fire will be allowed to back into riparian reservers and SMZs, but no active ignition will be allowed. At least 50% ground cover will be kept, more if on steeper slopes (see Erosion Control Plan, Appendix C in the Hydrology Report).
5.	Develop and apply erosion control plans to road construction, mining, recreation developments, and other site disturbing projects. Use the Soils and Geologic Resource Inventories for predicting the need and extent for erosion control measures.	An erosion control plan would be implemented for decommissioning of roads. Mitigation measures specific to skid trails, temporary roads and mechanical treatment would be implemented to protect soil resources and water quality.
Watershed & Water Quality (Pages IV - 40, 41)		
1a	Within all watersheds, identify depleted watershed areas during the project	During the development of this project, a separate NEPA project

	environmental assessment process. Incorporate improvement activities as a part of the project.	was completed to storm proof roads within the Pine Mountain project area, including the reroute of 18N69 away from an intermittent creek. Several sections of roads within the project have also been identified for decommissioning for watershed improvement as a part of the project.
1c	Within all watersheds, analyze projects that propose land disturbing activities for their effects on the appropriate level of watershed (normally second to fourth order watersheds) in order to prevent excessive cumulative watershed effects on stream channel condition and water quality. Cumulative watershed effects (CWE) analysis will be used to gauge impacts of past, present, and proposed management activities on a watershed.	CWE's were analyzed according to the ERA methodology (which includes past, present, and proposed activities). Cumulative activities within 7th field and 8th field watersheds remain below Threshold of Concern for all alternatives.
1d	Within all watersheds, implement Best Management Practices (BMP) to meet water quality objectives and maintain and improve the quality of surface water on the Forest. Identify methods and techniques for applying the BMPs during project level environmental analysis and incorporate them into the associated project plan and implementation documents.	BMPs prescribed in Appendix B of the Hydrology report and DEIS are based on field review of the units. These are also explained in the Erosion Control Plan, Appendix C of the Hydrology Report.
Riparian and Aquatic Ecosystems Pages (IV 30-33)		
1a.	Maintain and restore the distribution, diversity and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.	Alternatives 2 through 5 will help achieve these values and objectives by reducing fuels and returning fire to areas where fire has been suppressed.
1b.	Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.	This project is not anticipated to have a negative effect on spatial or temporal connectivity between watersheds. Alternatives 2 through 5 will have limited activities within Riparian Reserves while no mechanized equipment would be allowed within Streamside Management Zones.
1c.	Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.	There are no anticipated negative effects to these values by alternatives 2 through 5. Heavy equipment would be buffered from streams during thinning, while prescribed burning effects are anticipated to be much less than what would occur during a

		summer wildfire.
1d.	Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.	Decommissioning of 1.14 road miles within the project area would help restore water quality in several small streams (Alternatives 2 through 5). Other activities from these alternatives will not have a negative effect on water quality. Heavy equipment would be buffered from streams, while prescribed burning effects are anticipated to be much less than what would occur during a summer wildfire.
1e.	Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.	Decommissioning of 1.14 road miles within the project area would help restore the natural sediment regime in several small streams (Alternatives 2 through 5). There are no activities that are anticipated to negatively affect the sediment regime. Heavy equipment would be buffered from streams, while prescribed burning effects are anticipated to be much less than what would occur during a summer wildfire.
1h.	Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.	These values would be maintained and/or restored. The work would not take the RR vegetation outside the natural range, but rather help reduce (and prevent) future wildfire effects. Alternatives 2 through 5 will help achieve these values and objectives by reducing fuels and returning fire to areas where fire has been suppressed through several fire return intervals. Alternative 1 “No Action” would fail to yield these benefits.
1i.	Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	The purpose of this project will maintain the limited true riparian habitat within the project boundaries and help protect it from future wildfire. Project activities (Alternatives 2 through 5) along streams and around springs are expected to result in improved riparian habitat.
3b.(2)	In Riparian Reserves, do not use mitigation or planned restoration as a substitute for preventing habitat degradation.	Mitigation is not being substituted for prevention of habitat degradation; there are no proposed actions to degrade habitat in Riparian Reserves.

Appendix E – Acronyms and Glossary

List of Acronyms

AC – Activity Center

ACWO – Acorn woodpecker

ACS – Aquatic Conservation Strategy

BA – Biological Assessment

BAEA – Bald eagle

BAOW – Barred owl

BBS – Breeding Bird Survey

BE – Biological Evaluation

BLM – Bureau of Land Management

BMP – Best Management Practice

CATH – California thrasher

CDFW- California Department of Fish and Wildlife

CEQ – Council on Environmental Quality

CH – Critical Habitat

CHU – Critical Habitat Unit

CFR – Code of Federal Regulations

CWD – Coarse Woody Debris

CWE – Cumulative Watershed Effects

CWHR – California Wildlife Habitat Relationship

d.b.h. – Diameter at Breast Height

DEIS – Draft Environmental Impact Statement

EIS – Environmental Impact Statement

EPA – Environmental Protection Agency

ERA – Equivalent Roaded Acres

ESA – Endangered Species Act

FEIS – Final environmental impact statement

FYLF – Foothill yellow-legged frog

FS – Forest Service

FSH – Forest Service Handbook

FSM – Forest Service Manual

FWS – Fish and Wildlife Service

GIS – Geographic Information System

HCA – Habitat Conservation Area

HUC – Hydrologic Unit Code

ICC – Interior California Coast

ISC - Interagency Scientific Committee

LOP – Limited Operating Period

LRMP – Land and Resource Management Plan

LSRA – Late Successional Reserve Assessment

LSR – Late-successional Reserve

MBF – Thousand Board Feet

MNF- Mendocino National Forest

MIS – Management Indicator Species

MMBF – Million Board Feet

NEPA – National Environmental Policy Act

NFMA – National Forest Management Act

NFP – Northwest Forest Plan

NFS – National Forest System

NMFS – National Marine Fisheries Service

NOA – Notice of Availability

NOGO – Northern goshawk

NOI – Notice of Intent

N/R – Nesting and Roosting

NSO – Northern spotted owl

NTMB – Neotropical Migratory Bird

NWFP – Northwest Forest Plan

PCE – Primary Constituent Element

PEFA - Peregrine falcon

PGE – Pacific Gas & Electric

PIWO – Pileated woodpecker

PNV – Present Net Value

RD – Relative Density

ROD – Record of Decision

ROS – Recreational Opportunity Spectrum

S&G – Standards and Guidelines

SOHA – Spotted Owl Habitat Area

SMZ – Stream Management Zone

TOC – Threshold of Concern

TEP – Threatened, Endangered, and Proposed species under ESA

USDA – United States Department of Agriculture

USDI – United States Department of the Interior

VQO – Visual Quality Objectives

WA – Watershed Analysis

WNV – West Nile Virus

WPT – Western pond turtle

Glossary

Action Area- An action area is determined by the spatial and temporal patterns of physical, chemical, and biotic changes that 1) result from the proposed action, and 2) might place stress on the species regulated of concern (USFWS and NMFS 1998). For evaluations of the potential effects of vegetation management projects on northern spotted owls the action area is typically defined as the sum of the home ranges in which treatments would occur. The Pine Mountain Late Successional Reserve Habitat Enhancement and Protection project's action area is about 30,000 acres.

Activity Center- The location or point within the core use area that represent this central location. Northern spotted owl nest sites are typically used to identify activity centers, or in cases where nests have not been identified, breeding season roost sites or areas of concentrated nighttime detections may be used to identify activity centers.

Anthropogenic: The result of human activities or the influence of humans on nature.

Aquatic Conservation Strategy (ACS) – a strategy designed to assist in the recovery of anadromous fish stocks at risk that is part of the Northwest Forest Plan. The ACS consists of four components that are designed to operate together to maintain and restore the productivity and resiliency of riparian and riparian-dependent ecosystems. The components include riparian reserves, key watersheds, watershed analysis, and watershed restoration.

Best Management Practices (BMPs) – project-level practices used for water quality management on National Forest System lands within the State of California; see the Watershed Report for those BMPs that apply to this project.

Biodiversity: The abundant variety of plant, fungi, and animal species found in an ecosystem, including the diversity of genetics, species, and ecological type

Canopy Cover and Canopy Closure – the degree to which the canopy or the branches and foliage of a tree blocks sunlight or obscure the sky. More precisely, the ground area covered by tree crowns. Canopy cover is expressed as a percent of ground area.

California Wildlife Habitat Relationships – a system developed jointly by the Pacific Southwest Region of the Forest Service and the California Department of Fish and Game that classifies forest stands by dominant species types, tree sizes, and tree densities and rates the resulting classes in regard to habitat value for various wildlife species or guilds.

Crown Density: A measurement of the thickness or density of the foliage of the tree crown in a stand.

Cumulative Impact – the impact on the environment that results from the incremental impact of the action when added to the past, present, and foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Decommissioning – the practice of closing a road to mechanical use and returning the road to a natural or semi-natural condition. Decommissioning could include complete obliteration of the road prism (i.e., replacing fills into cuts and grading to match the natural topography) or more limited work including removing stream-crossing fills and structures (i.e., culverts) and shaping the abandoned road surface (e.g., constructing in-road waterbars). In both cases, it may involve mulching the surface with woody debris and/or planting erosion-control grasses.

Diameter at Breast Height (d.b.h.) – the diameter of a tree measured at 4.5 feet above the ground on the uphill side.

Ecological thinning- Addresses appropriate stem reduction to reduce competition and focuses on retention of trees that provide ecological services suitable for wildlife species and functional habitat.

Endangered Species – plant or animal species that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of Interior in accordance with the Endangered Species Act of 1973.

Environmental Analysis – analysis of a proposed Federal action and alternative actions and their predictable environmental effects, incorporating physical, biological, and socio-economic considerations.

Environmental Impact Statement (EIS) – a statement of the environmental effects of a proposed action and alternatives to it. It is required for major Federal actions under Section 102 of the National Environmental Policy Act (NEPA) and released to the public and other agencies for comment and review.

Existing Condition: The environmental conditions that occur at the present time.

Fire-Resilient Landscape: A natural landscape featuring plants that have adapted to local wildfire conditions.

Fireline – a corridor that has been cleared of organic material to expose mineral soil. Firelines may be constructed by hand or by mechanical equipment (e.g., dozers). Hand firelines are created by forest workers using shovels and hand tools to remove organic materials and expose mineral soil. The line width generally ranges from 2 to 3 feet, depending on the fuel loading.

Forest Stand Enhancement: A combination of both Silvicultural thinning practices and other forest restoration activities such as prescribed fire, which aim to increase the health, resiliency, and vigor of tree communities within a forest ecosystem.

Fuel Continuity: For chaparral plant communities the amount of continuous fuel materials in a fire's path that allows the fire to extend into other chaparral or forest fuels.

Future Desired Condition: The short-term and long-term goals desired from management activities.

Historic Natural Conditions: The natural condition of a property or area that occurred in the past, before fire suppression and industrial activities. Old photos, cultural history, and clues on the property such as old stumps may be helpful in identifying the historical natural condition.

Home Range- The area in which a spotted owl conducts its activities during a defined period of time that provides important habitat elements for nesting, roosting, and foraging. Home range sizes vary generally increase from south to north and vary in relation to habitat conditions and prey availability.

Ignition Zone: The place where combustion is initiated.

Inner Gorge: A stream reach bounded by steep valley walls, 65% slope and above, that terminate upslope into a more gentle topography. These are areas of rapid stream downcutting and/or uplift.

Issue – a point of discussion, debate, or dispute about environmental effects of the proposed action.

Ladder Fuels: Materials such as shrubs or small trees connecting the ground to the tree canopy or uppermost vegetation layer. In forests, this allows fire to climb upward into trees.

Landing – an area within the forest cleared of vegetation and graded level used to stockpile logs (create a log deck) and eventually to load log trucks for hauling to a mill.

Late-successional Forest – habitat that occurs in late-successional stands that are defined as "forest seral stages which include both mature and old-growth age classes".

Late-Successional Reserve (LSR) – one of 17 LRMP management areas (Management Area 8 – Special Habitat) that is intended to provide a core of relatively natural, undisturbed habitat for plants and animals associated with mature and old-growth forests (see LRMP, p. IV-34). **Live Crown Ratio** – proportion of a tree's bole occupied by branches with live needles or leaves, expressed as a percentage of the tree's total height.

Mainstem – the principle, largest or dominating stream or channel of any given area or drainage system.

Maintenance Level – Maintenance levels define the level of service provided by, and maintenance required for, a specific road.

> **Level 1:** Assigned to intermittent service roads during the times they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to acceptable levels and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level.
>
> **Level 2:** Assigned to roads open for use by high-clearance vehicles. Providing access for passenger cars is not a consideration. Traffic is normally minor, usually consisting of administrative, permitted, dispersed recreation, and/or other specialized uses. Log hauling may occur. Maintenance activities include roadside brushing, hazard-tree removal, surface blading, drainage maintenance, structure maintenance, clearing logs, slide and slip cleanup and repair, sign maintenance and surface replacement. Drainage function and soil stabilization are of prime importance. Many roads in this category have grass in the travel way.
>
> **Level 3:** Assigned to roads open and maintained for travel by prudent drivers in standard passenger cars. User comfort and convenience are not considered priorities. Roads in this

maintenance level are typically low-speed, single-lane, with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Maintenance is similar to level 2. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads.

Level 4: Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double-lane and aggregate-surfaced. However, some roads may be single-lane. Some roads may be paved and/or dust abated. Maintenance is similar to levels 2 and 3. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads.

Level 5: Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved. Some may be aggregate-surfaced and dust-abated. All of level 5 roads within a national forest have a permanent (paved) surface.

Management Indicator Species (MIS) – species whose populations are believed to respond to management activities chosen to represent conditions of specific habitat types. They are selected by each National Forest (see LRMP, p. IV-96).

Partial Retention – visual quality objective of providing a near-natural-appearing landscape, where management activities may be evident but must remain visually subordinate to the characteristic landscape.

Piles or Burn Piles – piling harvest or thinning residues (branches and limbs, or slash) and burning when moisture content has been reduced through evaporation, wildfire hazard is low, and atmospheric conditions are favorable for dispersal of smoke.

Planning Area – a predetermined area that encompasses a project area opportunity.

Prescribed Fire: A forest management practice that uses fire to improve habitat or reduce hazardous fuels. A plan for the prescribed burn must be written out and approved, and specific requirements must be met before commencing burning.

Productive: A term used for land or forests that are growing efficiently and in a vigorous manner.

Project area – the land base within a planning area where the connected actions associated with the project alternative take place (i.e., harvest units, haul routes, drafting sources, etc.)

Project Design Features – parameters and requirements built into the design of a project to reduce, minimize, or eliminate impacts to various natural and human resources in order to ensure project compliance with the resource protection standards and guidelines of the LRMP. These features include Best Management Practices (BMPs).

Quadratic Mean Diameter (QMD)- QMD is an expression of the diameter of the tree with the average basal area.

Record of Decision (ROD) – a document separate from, but associated with, an environmental impact statement that: 1) states the management decision; 2) states the reason for that decision; 3) identifies all alternatives including the environmentally preferable and selected alternatives; and 4) states whether all practicable measures to avoid environmental harm from the selected alternative have been adopted, and if not, why.

Resilient, Resiliency: The ability of an ecosystem to return to its balanced state after a disturbance.

Retention – visual quality objective of providing a natural-appearing landscape where management activities are not visually evident to the casual forest visitor.

Riparian Reserves – one of 17 management areas under the LRMP and NWFP; established by the Forest Service to give special management considerations to protect the integrity of ecosystems bordering bodies of water and wetlands for riparian and aquatic-dependent species. Riparian Reserves includes unstable and potentially unstable lands.

Recreation Opportunity Spectrum (ROS) -- The Recreation Opportunity Spectrum (ROS) is a system for classifying and managing recreation opportunities based on the following criteria: physical setting, social setting, and managerial setting. The combination of the three criteria results in six different ROS classes, which are primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban.

Schedule of Proposed Actions (SOPA) – a notice of potential FS actions on each National Forest distributed quarterly to parties who have requested it. Contact the MNF's planning staff officer to be included on the distribution list or visit the website at: https://www.fs.fed.us/sopa/forest-level.php?110508

Sensitive Species – species listed as such by the Regional Forester of the FS Pacific Southwest Region because their populations are such that FS management actions could contribute to a trend toward eventual listing by FWS/NMFS as threatened or endangered species.

Seral Stage – the stage in the successional development of an ecosystem; an ecological stage, usually identified by vegetation types.

Shaded Fuelbreaks: A fuel-reduction technique for forested areas. Vegetation is reduced and/or modified to reduce fire hazard, but an adequate amount of crown canopy remains intact.

Shrub communities: Shrub vegetative communities are generally referred to as chaparral.

Significant Issue – a point of discussion, debate, or dispute about environmental effects that are within the scope of a proposed action; is relevant, not already decided by law, regulation, LRMP, or other higher level decision; and is supported by scientific evidence. This issue type generally forms the basis for the development of alternatives to the proposed action.

Silviculture – the science and practice of manipulating vegetation in forest stands to meet management goals and objectives.

Site-Potential Tree – a tree that has attained the average maximum height possible given site conditions where it occurs. The measured height of a site-potential tree is used to determine timber production potential of a site and used to define the width of riparian reserves under the interim riparian reserve designation rules of the LRMP.

Site-Specific: Applicable to a specific piece of land and its associated attributes and conditions (e.g. microclimate, soils, vegetation).

Skid Trails – off-road routes taken by tractors to access felled trees and to drag them to log landings.

Slash – residue from timber harvest or thinning; limbs, branches, and damaged small trees.

Snag – a dead standing tree.

Soil Types: Refers to the different combinations of soil particles and soil composition. Soil can vary greatly within short distances.

Stocking – the number of trees per acre.

Surface Fuels: Materials on the ground like needles or low-growing shrubs that provide the fuel for fires to spread on the ground. Surface fuels are generally considered all fuels within six feet of the ground.

System Road – National Forest System roads that are considered part of the FS transportation network and are maintained to certain standards for identified purposes. Non-system roads are other existing roads that are not maintained by the FS because they are not needed for a public purpose.

Territories (Core Areas)- Territories are defined as the area within a 0.5 miles circle (about 500 acres) around a northern spotted owl Activity Center. The size of the circle is related to the acreage most heavily used by owl during the nesting season.

Thinning From Below (low thinning): A Silvicultural technique in which understory trees (usually subdominant trees) are removed. The objective is to reduce ladder fuels, raise height to crown base, space crowns of overstory trees, in order to promote the growth of retained trees. Thinning from below will remove overtopped and intermediate trees with only minor removal of codominant trees. No dominate or predominate trees will be removed. Trees removed are typically smaller in diameter, so a low thinning effectively increases the average dbh in the stand.

Threatened Species – plant or animal species likely to become endangered throughout all or a specific portion of its range within the foreseeable future, as designated by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973.

Treatment Prescription: A treatment prescription as it relates to fuel hazard reduction and ecosystem health is a sequence of steps to bring the forestland, woodland, Shrubland, or grassland back to a healthier state. Treatment efforts will ideally increase the area's resiliency to fire as a natural disturbance that can occur occasionally without burning the entire landscape to the ground. Refer to the Silvicultural Report (USDA 2017b) and the Fire and Fuels Report (USDA 2016c) for a discussion of the sequence of steps that went into treatment development.

Unstable and Potentially Unstable Lands: The unstable land component of Riparian Reserves includes lands which are prone to mass failure under natural conditions (unroaded, unharvested), and where human activities such as road construction and timber harvest are likely to increase landslide distribution in time and space, to the point where this change is likely to modify natural geomorphic and hydrologic processes (such as delivery of sediment and wood to channels), which will in turn affect aquatic ecosystems including streams, springs, seeps, wetlands, and marshes.

The following types of land are included: 1) active landslides and those which exhibit sound evidence of movement in the past 400 years; 2) inner gorges; 3) those lands identified as unstable by geologic investigations, using the criteria stated above. Highly erodible lands are not included in this definition.

Variable density thinning: Form an ecological forestry position, a thinning approach used to create, sustain or restore structural and compositional heterogeneity throughout the stand. Thinning shall strive to maintain the current mosaic of variable diameter distribution and species composition. The intent is to increase biodiversity or wildlife habitat. Some portions of the stand may not be entered. Some portions of the stand may favor hardwood retention. Some portions of the stand may have higher basal area retention for large diameter trees and lower basal area retention for smaller diameter trees. Some portions of the stand may have a requirement for greater clearance around a particular tree species.

Visual Quality Objective (VQO) – management objective for scenic quality based on physical and sociological characteristics of an area that establishes the maximum level of future alteration to an area's landscape.

Yarding Unutilized Material (YUM) – translocation of unutilized material during logging operations from the unit to the landing for future disposal via pile burning or biomass/firewood utilization by the public